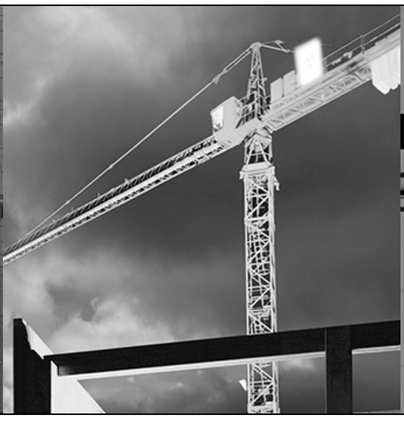
Operating Instructions

Explosion-Proof AC Motors EDR.71 – 225

Edition 06/2011

17076013 / EN



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1 General Information

1.1 How to use this documentation

The documentation is an integral part of the product and contains important information on operation and service. The documentation is written for all employees who assemble, install, startup, and service this product.

The documentation must be accessible and legible. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE.

1.2 Structure of the safety notes

1.2.1 Meaning of the signal words

The following table shows the grading and meaning of the signal words for safety notes, notes on potential risks of damage to property, and other notes.

Signal word	Meaning	Consequences if disregarded
⚠ DANGER	Imminent danger	Severe or fatal injuries
⚠ WARNING	Possible dangerous situation	Severe or fatal injuries
⚠ CAUTION	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the drive system or its environment
NOTE ON EXPLOSION PROTECTION	Important note on explosion protection	Suspension of explosion protection and resulting hazards
INFORMATION	Useful information or tip: Simplifies the handling of the drive system.	

1.2.2 Structure of the section-related safety notes

Section safety notes do not apply to a specific action, but to several actions pertaining to one subject. The used symbols indicate either a general or a specific hazard.

This is the formal structure of a section safety note:

⚠ SIGNAL WORD

Type and source of danger.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the danger.

1.2.3 Structure of the embedded safety notes

Embedded safety notes are directly integrated in the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

- **⚠ SIGNAL WORD** Nature and source of hazard.

  Possible consequence(s) if disregarded.

  – Measure(s) to prevent the danger.

1.3 Rights to claim under warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the documentation. Read the documentation before you start working with the unit!

1.4 Exclusion of liability

You must comply with the information contained in this documentation to ensure safe operation of the EDR.. series AC motors units and to achieve the specified product characteristics and performance requirements. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of the documentation. In such cases, any liability for defects is excluded.

1.5 Copyright

© 2011 - SEW-EURODRIVE. All rights reserved.

Copyright law prohibits the unauthorized duplication, modification, distribution, and use of this document, in whole or in part.

1.6 Product name and trademarks

The brands and product names contained within this publication are trademarks or registered trademarks of the titleholders.

2 Safety Notes

The following basic safety notes must be read carefully to prevent injury to persons and damage to property. The operator must ensure that the basic safety notes are read and adhered to. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the operating instructions carefully and understood them. If you are unclear about any of the information in this documentation or if you require further information, please contact SEW-EURODRIVE.

2.1 Preliminary information

The following safety notes are primarily concerned with the use of the following components: EDR.. series AC motors. If using gearmotors, please also refer to the safety notes in the corresponding operating instructions for:

- Gear unit

Also observe the supplementary safety notes in the individual sections of this documentation.

2.2 General information

⚠ WARNING

During operation, the motors and gearmotors can have live, bare (in the event of open connectors/terminal boxes) and movable or rotating parts as well as hot surfaces, depending on their enclosure.

Severe or fatal injuries.

- All work related to transportation, storage, installation, assembly, connection, startup, maintenance and repair may only be carried out by qualified personnel, in strict observance of:
  - – The relevant detailed operating instructions
  - – The warning and safety signs on the motor/gearmotor
  - – All other project planning documents, operating instructions and wiring diagrams related to the drive
  - – The specific regulations and requirements for the system
  - – The national/regional regulations governing safety and the prevention of accidents
- Never install damaged products
- Immediately report any damage to the shipping company

Removing the required protection cover or the housing without authorization, improper use as well as incorrect installation or operation may result in severe injuries to persons or damage to property.

This documentation provides additional information.

2.3 Target group

Any mechanical work may only be performed by adequately qualified personnel. Qualified staff in the context of this documentation are persons familiar with the design, mechanical installation, troubleshooting and servicing of the product who possess the following qualifications:

- Training in mechanical engineering, e.g. as a mechanic or mechatronics technician (final examinations must have been passed).
- They are familiar with these operating instructions.

Any electronic work may only be performed by adequately qualified electricians. Qualified electricians in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting and servicing of the product who possess the following qualifications:

- Training in electrical engineering, e.g. as an electrician, electronics or mechatronics technician (final examinations must have been passed).
- They are familiar with these operating instructions.

All work in further areas of transportation, storage, operation and waste disposal must only be carried out by persons who are trained appropriately.

All qualified personnel must wear appropriate protective clothing.

2.4 Designated use

The explosion-proof electric motors are intended for industrial systems.

When installed in machines, startup of the motors (i.e. start of designated operation) is prohibited until it is determined that the machine meets the requirements stipulated in EC Directive 94/9/EC (ATEX Directive).

NOTES ON EXPLOSION PROTECTION

- The motor is only allowed to be operated under the conditions described in the "Startup" section.
- A motor may only be operated with the frequency inverter when the requirements of the prototype test certificates and/or this documentation and the information on the nameplate of the motor, if available, are fulfilled.
- There may be no aggressive substances in the vicinity that could damage the paint and seals.
- The motors must not be operated in areas/applications that cause strong electrical charge on the motor housing, e.g. as a fan motor in a dust-transporting tube as this may cause electrostatic charge of the coated surfaces.

Air-cooled types are dimensioned for ambient temperatures of -20 °C to +40 °C and installation altitudes ≤ 1000 m above sea level. Note that information on the nameplate may differ. The ambient conditions must comply with all the specifications on the nameplate.

2.5 Other applicable documentation

The following publications and documents have to be observed as well:

- Wiring diagrams provided with the motor
- Operating instructions "Explosion-Proof Gear Units R..7, F..7, K..7, S..7 Series, SPIROPLAN® W" for gearmotors
- Operating instructions of any mounted frequency inverter for motors powered by inverters.
- Operating instructions of installed options, if applicable
- "DR Series AC Motors" catalog and/or
- "DR Gearmotors" catalog
- "Explosion-Proof AC Motors" catalog and/or
- "Explosion-proof drives" catalog

2.6 Transport/storage

Inspect the shipment for any damage that may have occurred in transit as soon as you receive the delivery. Inform the shipping company immediately. It may be necessary to preclude startup.

Tighten the eyebolts securely. They are designed to only carry the weight of the motor/ gearmotor; do not attach any additional loads.

The built-in lifting eyebolts comply with DIN 580. Always observe the loads and regulations listed in this standard. If the gearmotor is equipped with two eyebolts, then both of these should be used for transportation. In this case, the tension force vector of the slings must not exceed a 45° angle according to DIN 580.

Use suitable, sufficiently rated handling equipment if required. Reattach these in the case of further transportation.

Store the motor/gearmotor in a dry, dust-free environment if it is not to be installed straight away. You must not store the motor/gearmotor outdoors or on the fan guard. The motor/gearmotor can be stored for one year without requiring any special measures before startup.

2.7 Installation

Make sure that the supports are even, the foot and flange mounting is correct and if there is direct coupling, align with precision. Resonances between the rotational frequency and the double network frequency caused by the structure are to be avoided. Release the brake (if installed), turn rotor manually, check for unusual grinding noise. Check the direction of rotation in decoupled status.

Only install or remove belt pulleys and couplings using suitable devices (heat up) and cover with a touch guard. Avoid improper belt tension.

Make the pipe connections that may eventually be required. Mounting positions with shaft ends pointing upwards should be equipped with a cover to prevent foreign objects from falling into the fan. Ensure that ventilation openings are not obstructed and that used air, including air from adjacent units, cannot be drawn in again straight away.

Observe the notes in the "Mechanical Installation" chapter.

2.8 Electrical connection

All work may only be carried out by qualified personnel. During work, the low-voltage machine must be on standstill, enabled, and safeguarded against an accidental restart. This also applies to auxiliary circuits (e.g. anti-condensation heating or forced cooling fan).

Check that the motor is de-energized!

Exceeding the tolerances in EN 60034-1 (VDE 0530, part 1) – voltage +5 %, frequency +2 %, curve shape, symmetry – increases the heating and influences electromagnetic compatibility. Also observe DIN IEC 60364 and EN 50110 (and, if applicable, other national regulations, such as DIN VDE 0105 for Germany).

In addition to the generally applicable installation regulations for low-voltage equipment, it is also necessary to comply with the special regulations for setting up electrical machinery in potentially explosive atmospheres (operating safety regulations in Germany: EN 60079-14; EN 61241-14 and system-specific regulations).

Observe the wiring information and differing data on the nameplate as well as the wiring diagram in the terminal box.

The connection should be a continuous secure electrical connection (no protruding wire ends); use the cable end equipment intended for this purpose. Establish a secure protective earth connection. When the motor is connected, the distances between live and conductive parts must not be shorter than the minimum values according to DIN EN / IEC 60079-7 and -15 and national regulations. The minimum values according to the respective standards must be observed, see the following table:

Nominal voltage V_N	**Distance for motors in category 3 (DIN EN / IEC 60079-15)**	**Distance for motors in category 2 (DIN EN / IEC 60079-7)**
≤ 500 V	5 mm	8 mm
> 500 V to ≤ 690 V	5.5 mm	10 mm

The terminal box must be free of foreign objects, dirt and humidity. Unused cable entry openings and the box itself must be closed so that they are dust and water proof. Secure keys for test mode without output elements. Assure yourself of the flawless operability prior to starting up low-voltage machines.

Observe the notes in the "Electrical Installation" chapter.

2.9 Startup/operation

Whenever changes to normal operation occur, such as increased temperatures, noise, vibrations, etc., you should determine the cause. Consult the manufacturer if required. Never deactivate protection devices, even in test mode. Switch off the motor if you are not sure.

Regularly clean air ducts in dusty or dirty environments.

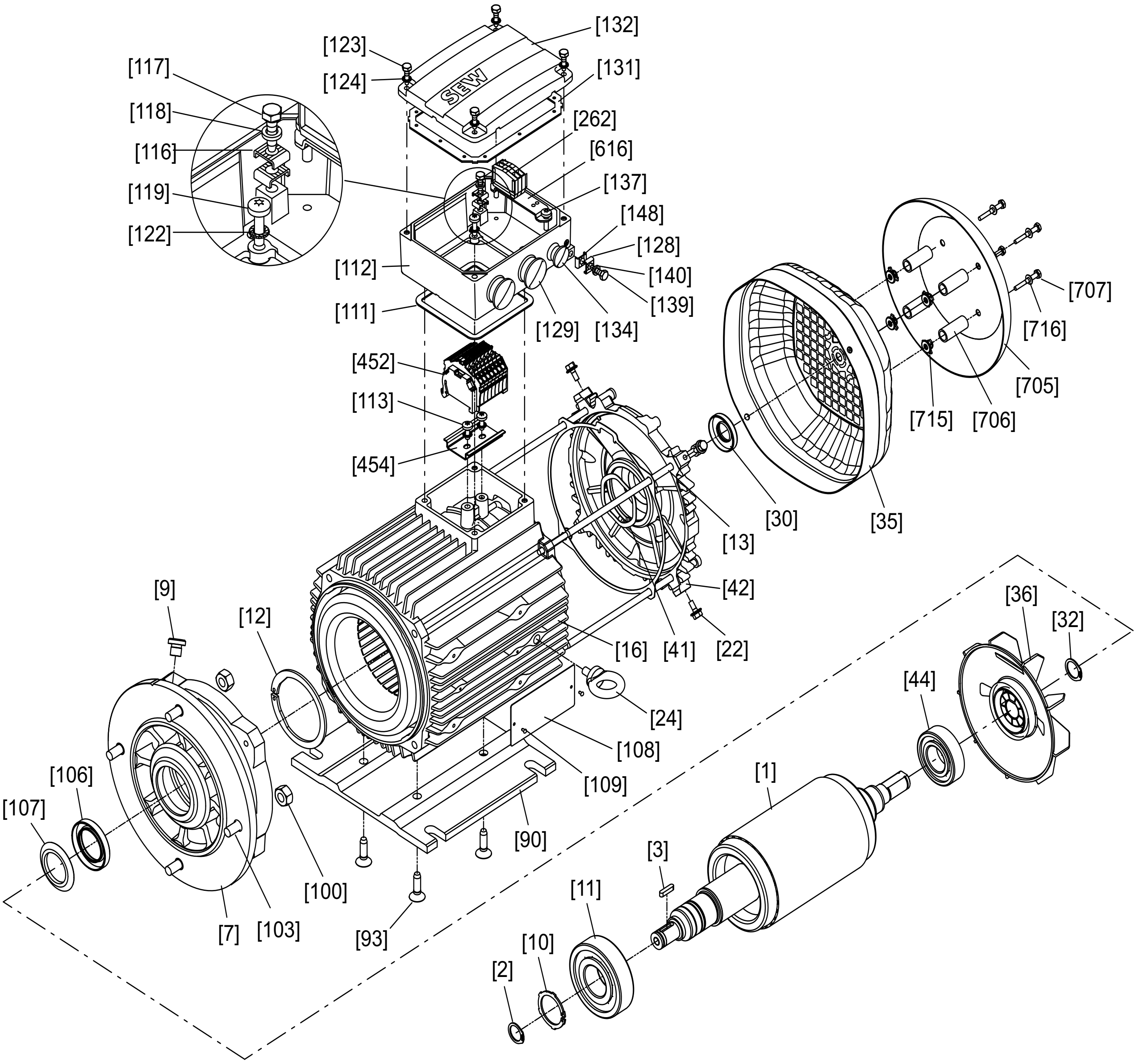
3 Motor Structure

INFORMATION

The following illustration is intended to explain the general structure. It helps you to assign components to the spare parts list. Deviations are possible depending on the motor size and version.

3.1 General structure of EDR.71 – EDR.132

The following figure shows an example of the basic structure of EDR.71 – EDR.132 with spring terminal strip: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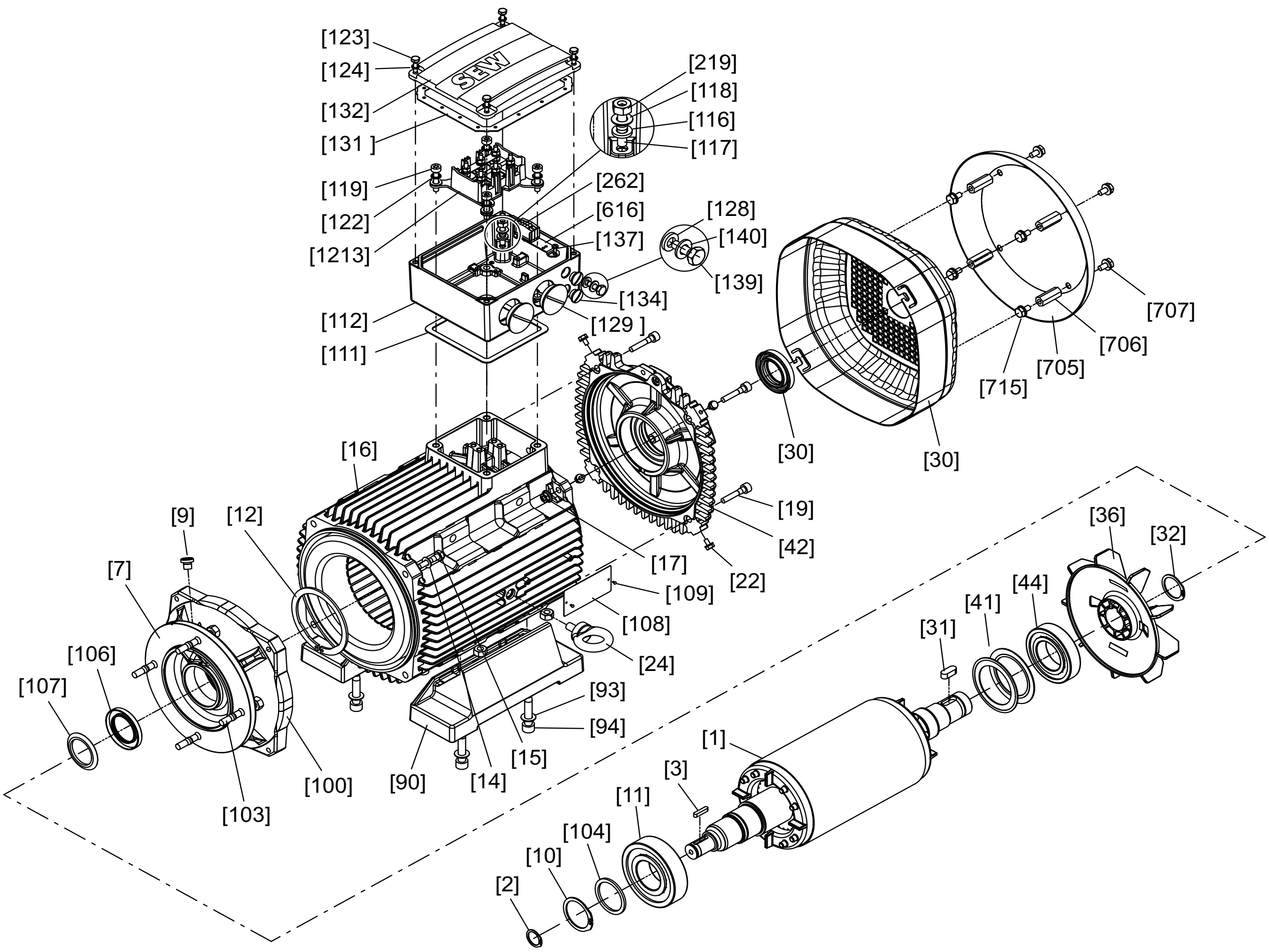
[1]	Rotor
[2]	Retaining ring
[3]	Key
[7]	Flanged endshield
[9]	Screw plug
[10]	Retaining ring
[11]	Grooved ball bearing
[12]	Retaining ring
[13]	Machine screw
[16]	Stator
[22]	Hex head screw
[24]	Eyebolt
[30]	Oil seal
[32]	Retaining ring
[35]	Fan guard
[36]	Fan
[41]	Shim
[42]	B-side endshield
[44]	Grooved ball bearing
[90]	Base plate
[93]	Countersunk screw
[100]	Hex nut
[103]	Stud
[106]	Oil seal
[107]	Oil flinger
[108]	Nameplate
[109]	Grooved pin
[111]	Gasket for lower part
[112]	Terminal box lower part
[113]	Pan head screw
[116]	Terminal clip
[117]	Hex head screw
[118]	Lock washer
[119]	Pan head screw
[122]	Lock washer
[123]	Hex head screw
[124]	Lock washer
[128]	Terminal clip
[129]	Screw plug
[131]	Gasket for cover
[132]	Terminal box cover
[134]	Screw plug
[137]	Screw
[139]	Hex head screw
[140]	Lock washer
[148]	Terminal clip
[262]	Terminal
[392]	Seal
[452]	Terminal strip
[454]	Support rail
[616]	Retaining plate
[705]	Canopy
[706]	Spacers
[707]	Pan head screw
[715]	Blind rivet
[716]	Washer

3.2 *General structure EDR.160 – EDR.180*

The following figure shows an example of the basic structure of EDR.160 – EDR.180 with anti-twist frame: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[32]
[44]
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[1]
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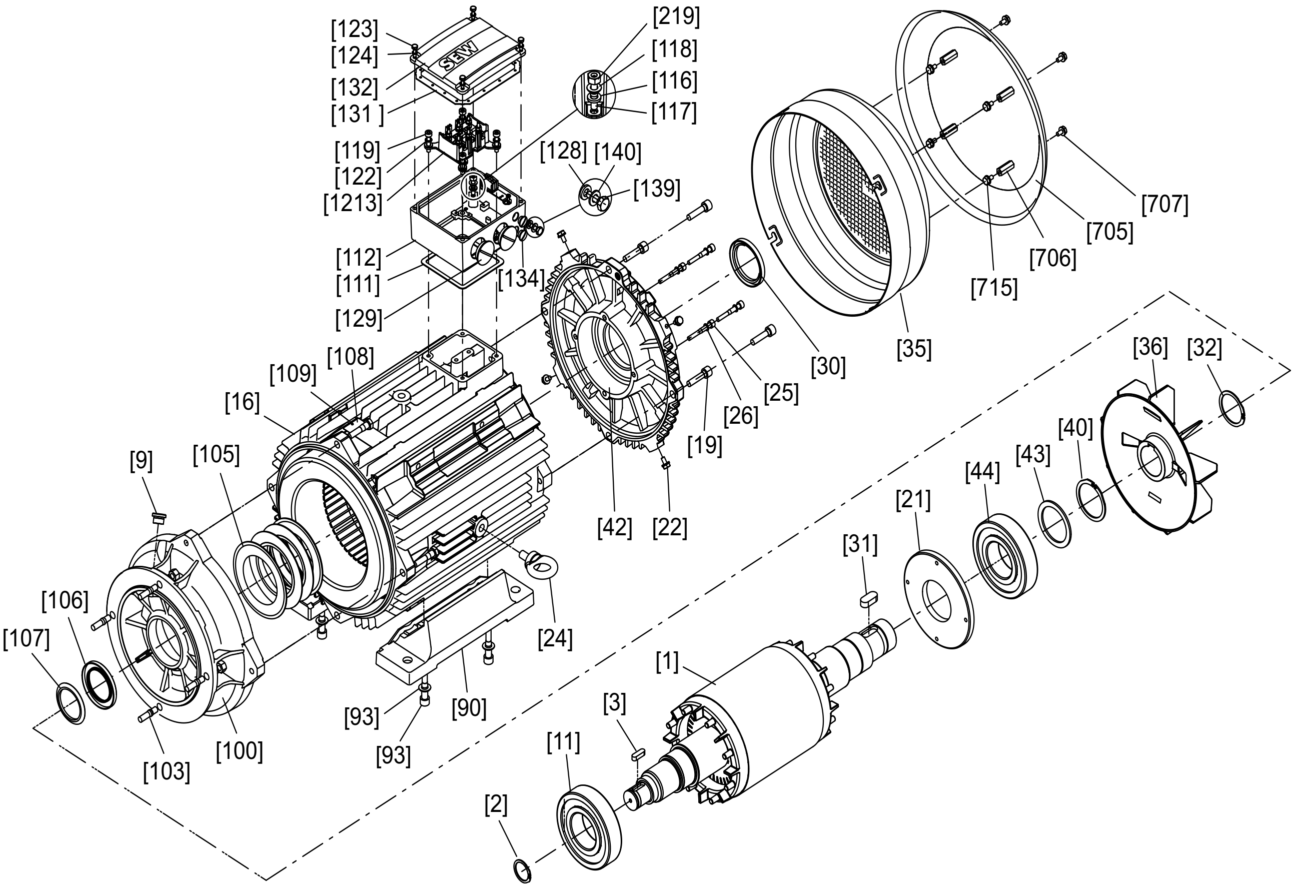
[1]	Rotor
[2]	Retaining ring
[3]	Key
[7]	Flange
[9]	Screw plug
[10]	Retaining ring
[11]	Grooved ball bearing
[12]	Retaining ring
[14]	Washer
[15]	Hex head screw
[16]	Stator
[17]	Hex nut
[19]	Machine screw
[22]	Hex head screw
[24]	Eyebolt
[30]	Sealing ring
[31]	Key
[32]	Retaining ring
[35]	Fan guard
[36]	Fan
[41]	Spring washer
[42]	B-side endshield
[44]	Grooved ball bearing
[90]	Foot
[91]	Hex nut
[93]	Washer
[94]	Machine screw
[100]	Hex nut
[103]	Stud
[104]	Supporting ring
[106]	Oil seal
[107]	Oil flinger
[108]	Nameplate
[109]	Grooved pin
[111]	Gasket for lower part
[112]	Terminal box lower part
[116]	Serrated lock washer
[117]	Stud
[118]	Washer
[119]	Machine screw
[122]	Lock washer
[123]	Hex head screw
[124]	Lock washer
[128]	Serrated lock washer
[129]	Screw plug
[131]	Gasket for cover
[132]	Terminal box cover
[134]	Screw plug
[139]	Hex head screw
[140]	Washer
[219]	Hex nut
[705]	Canopy
[706]	Spacers
[707]	Hex head screw
[715]	Hex head screw
[1213]	Kit (1 anti-twist frame, 1 terminal board, 4 sleeves, 2 screws, 2 nuts)

3.3 General structure EDR.200 – EDR.225

The following figure shows an example of the basic structure of EDR.200 – EDR.225 with anti-twist frame: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[32]
[40]
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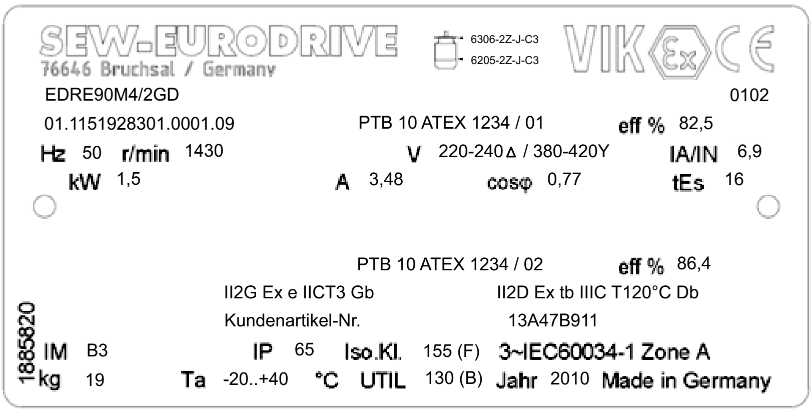
[1]	Rotor
[2]	Retaining ring
[3]	Key
[7]	Flange
[9]	Screw plug
[11]	Grooved ball bearing
[16]	Stator
[19]	Machine screw
[21]	Oil seal flange
[22]	Hex head screw
[24]	Eyebolt
[25]	Machine screw
[26]	Sealing washer
[31]	Key
[32]	Retaining ring
[35]	Fan guard
[36]	Fan
[40]	Retaining ring
[42]	B-side endshield
[43]	Supporting ring
[44]	Grooved ball bearing
[90]	Foot
[93]	Washer
[94]	Machine screw
[100]	Hex nut
[103]	Stud
[105]	Spring washer
[106]	Oil seal
[107]	Oil flinger
[108]	Nameplate
[109]	Grooved pin
[111]	Gasket for lower part
[112]	Terminal box lower part
[107]	Oil flinger
[116]	Serrated lock washer
[117]	Stud
[118]	Washer
[119]	Machine screw
[123]	Hex head screw
[124]	Lock washer
[128]	Serrated lock washer
[129]	Screw plug
[131]	Gasket for cover
[132]	Terminal box cover
[134]	Screw plug
[139]	Hex head screw
[140]	Washer
[219]	Hex nut
[705]	Canopy
[706]	Spacer bolt
[707]	Hex head screw
[715]	Hex head screw
[1213]	Kit (1 anti-twist frame, 1 terminal board, 4 sleeves, 2 screws, 2 nuts)

3.4 Nameplate, type designation

3.4.1 Nameplates of EDR. motors

EDRE motor in category 2GD

The following figure shows a nameplate:



SEW-EURODRIVE
76646 Bruchsal / Germany
6306-2Z-J-C3
6205-2Z-J-C3
VIK Ex CE
EDRE90M4/2GD 0102
01.1151928301.0001.09 PTB 10 ATEX 1234 / 01 **eff %** 82,5
Hz 50 **r/min** 1430 **V** 220-240△ / 380-420Y **IA/IN** 6,9
kW 1,5 **A** 3,48 **cosφ** 0,77 **tEs** 16
PTB 10 ATEX 1234 / 02 **eff %** 86,4
II2G Ex e IICT3 Gb II2D Ex tb IIIC T120°C Db
Kundenartikel-Nr. 13A47B911
1885820
IM B3 **IP** 65 **Iso.Kl.** 155 (F) **3~IEC60034-1 Zone A**
kg 19 **Ta** -20..+40 **°C** **UTIL** 130 (B) **Jahr** 2010 **Made in Germany**

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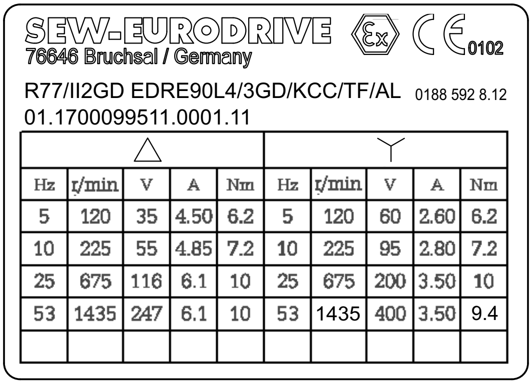
The marks (see page 150) on the upper edge of the nameplate are only present when the motor has been certified accordingly or when it includes the relevant components.

EDRE motor with frequency inverter

The following figure shows a nameplate:



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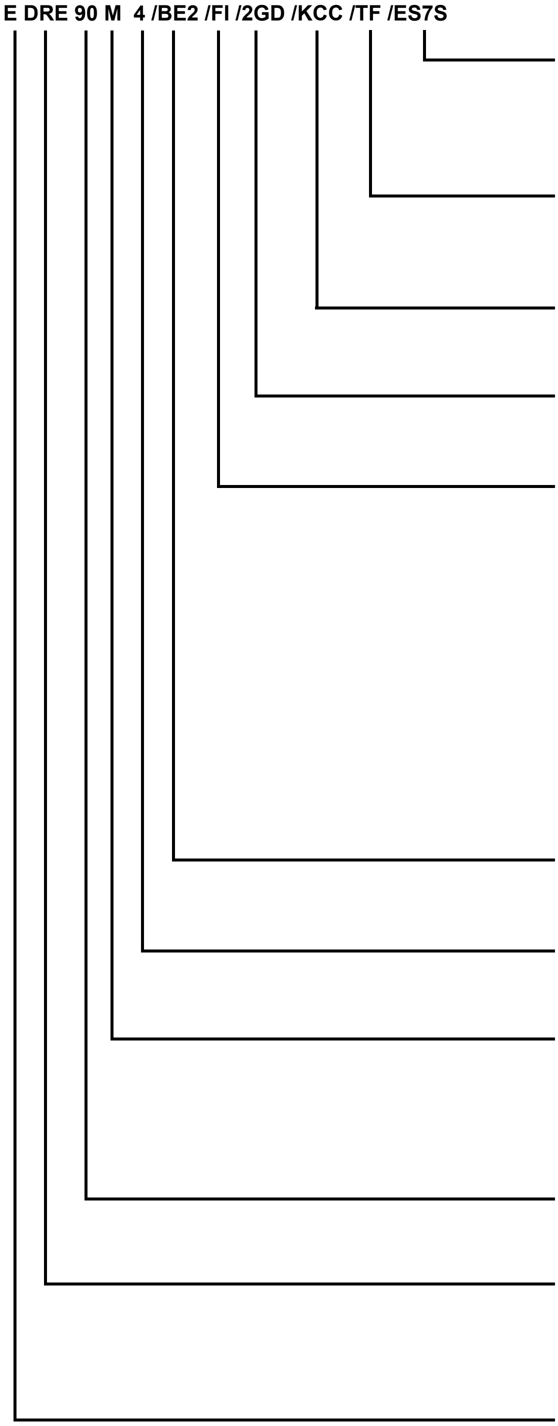
△					Y				
Hz	r/min	V	A	Nm	Hz	r/min	V	A	Nm
5	120	35	4.50	6.2	5	120	60	2.60	6.2
10	225	55	4.85	7.2	10	225	95	2.80	7.2
25	675	116	6.1	10	25	675	200	3.50	10
53	1435	247	6.1	10	53	1435	400	3.50	9.4

9007202350032139

3.4.2 Type designations of EDR. motors

EDR.. series AC motor

The following diagram shows a type designation:



Encoder motor option:
- Incremental encoders ES7., EG7., AS7., AG7.
- Incremental encoder EV2., EV7.
- Absolute encoder AV7.

Motor protection motor option:
- TF temperature sensor
- PT or KY temperature detection

Motor connection:
- via KCC terminal strip

Explosion protection category:
- 2G, 2GD or 3GD

Output variant:
- /FF: IEC flange-mounted motor with bore holes
- /FG: 7 Series integral motor, as stand-alone motor
- /FM: 7 Series integral motor with IEC feet
- /FI: IEC foot-mounted motor
- /FT: IEC flange-mounted motor with threads
- /FE: IEC flange-mounted motor with bore and IEC feet
- /FY: IEC flange-mounted motor with threads and IEC feet
- /FL: General flange-mounted motor (deviating from IEC)
- /FK: General flange-mounted motor (deviating from IEC) with feet

Brake:
- BE.. spring-loaded brakes with size specification

Number of poles:
- 4

Motor length:
- S: Short
- M: Medium
- L: Long
- LC: Rotors with copper cage

Motor size:
- 71 – 225

DR motor series with code letter:
- S: Energy-efficient motor variant
- E: Energy-efficient motor variant IE2 or MEPS AS (Australia/New Zealand)

Code letter for explosion protection

3.5 Additional features

3.5.1 AC motor series

The following table shows the AC motor variants:

Designation	Category	
EDRS..	/2G, /2GD, /3GD	ATEX motor, 50 Hz
EDRE..		ATEX energy-efficient motor, High Efficiency IE2, 50 Hz
71 – 225		Sizes: 71 / 80 / 90 / 100 / 112 / 132 / 160 / 180 / 200 / 225
S – L		Lengths: S = Short / M = Medium / L = Long LC = Rotors with copper cage
4		Number of poles

3.5.2 Output variants

The following table shows possible output variants:

Designation	Category	Option
/FI	/2G, /2GD, /3GD	IEC foot-mounted motor with specification of shaft height
/FG		7 Series integral motor, as stand-alone motor
/FF		IEC flange-mounted motor with bore holes
/FT		IEC flange-mounted motor with threads
/FL		General flange-mounted motor (other than IEC)
/FM		7 series integral gearmotor with IEC feet, with specification of shaft height if required
/FE		IEC flange-mounted motor with bore holes and IEC feet, with specification of shaft height
/FY		IEC flange-mounted motor with thread and IEC feet, with specification of shaft height if required
/FK		General flange-mounted motor (other than IEC) with feet, with specification of shaft height if required

3.5.3 Mechanical attachments

The following table shows possible mechanical attachments:

Designation	Category	Option
/BE	/3GD	Spring-loaded brake with specification of size
/RS	/2G, /2GD, /3GD	Backstop

3.5.4 Temperature sensor/temperature detection

The following table shows the thermal protection options:

Designation	Category	Option
/TF	/2G, /2GD, /3GD	Temperature sensor (PTC resistors)
/KY	/2G, /2GD, /3GD	One KTY84 – 130 sensor
/PT	/2G, /2GD, /3GD	One / three PT100 sensor(s)

3.5.5 Encoder

The following table shows possible encoder variants:

Designation	Category	Option
/ES7S /EG7S /EV7S	/3GD	Mounted speed sensor with sin/cos interface
/ES7R/ EG7R /EV7R		Mounted speed sensor with TTL (RS-422) interface, V = 9 – 26 V
/AS7W /AG7W /AV7W		Mounted absolute encoder, RS-485 interface (multi-turn)
/AS7Y /AG7Y /AV2Y /AV7Y		Mounted absolute encoder, SSI interface (multi-turn)
/ES7A/EG7A		Mounting adapter for encoders from the SEW portfolio
/XV.A		Mounting adapter for non-SEW encoders
/XV..		Mounted non-SEW encoders

3.5.6 Alternative connection options

The following table shows the connection variants:

Designation	Category	Included in the scope of delivery
/KCC	/2G, /2GD, /3GD	Terminal strip with cage clamps (for EDR.71 – EDR.132)

3.5.7 Ventilation

The following table shows possible ventilation variants:

Designation	Category	Option
/VE	/3GD	Forced cooling fan for motors according to 94/9/EC, category 3 (gas / dust)
/AL	/2G, /2GD, /3GD	Metal fan
/C	/2G, /2GD, /3GD	Protection canopy for the fan guard

3.5.8 Explosion-proof motors

The following table shows the possible explosion protection categories:

Designation	Option
/2G, /2GD	Motors according to 94/9/EC, category 2 (gas / dust)
/3GD	Motors according to 94/9/EC, category 3 (gas / dust)

3.5.9 Other additional features

The following table shows an additional feature:

Designation	Category	Option
/2W	/2G, /2GD, /3GD	Second shaft end on the motor/brakemotor

3.6 Explosion protection designations

With the revision of the explosion protection standards, new designations have been implemented internationally (IEC), the so-called **E**quipment **P**rotection **L**evels (EPL). Parallel to the explosion protection categories, these levels specify the applicability of the devices according to the zone categorization of the potentially explosive atmospheres.

With the revision of EN 60079-0, from 2010, the EPL have also been adopted to European standards.

The following table shows the assignment of the EPL tot he zones:

Gas			Dust		
EPL :	**Category:**	**use in zone:**	**EPL :**	**Category:**	**use in zone:**
Ga	1G	0	**Da**	1D	20
Gb	2G	1	**Db**	2D	21
Gc	3G	2	**Dc**	3D	22

With the revision of the IEC 60079 "electrical apparatus for potentially explosive atmospheres" the dust explosion protection has been integrated in this set of standards as part 31. The separate dust standard IEC 61241-1 has become invalid with the release of IEC 60079-31 in November 2008.

The international standard IEC 60079 will be harmonized as EN standard with the same number and the same content in the foreseeable future.

The equipment group III for dust has also been implemented as part of this integration. Thus there are 3 equipment groups in international standards:

Equipment group	Equipment for the use
I	In mine openings with a risk of firedamp (underground mining)
II	In areas with potentially explosive gas/air mixtures
III	In areas with potentially explosive dust/air mixtures

In addition, the new equipment group III has been split up into three subgroups "A", "B" and "C" depending on the type of dust:

Equipment group	Suitable for atmospheres with	Minimum degree of protection IP (x = placeholder)
IIIA	Flammable lint	5x
IIIB	Non-conducting dust	5x
IIIC	Conducting dust	6x

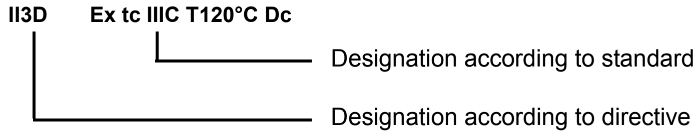
The specific values of equipment groups IIIA to IIIC for the dust/air mixture correspond to the previous designation IIA to IIC for gas/air mixtures.

Previously, the designation IIA to IIC has only be used for motors in EX-d design (flameproof). Now, the designation of motors of a protection type with increased safety "e" is changed from II (without letter) to IIA, IIB, or IIC. This implies demands on the prevention of electrostatic charge of plastic surfaces, e.g. fans and coated, metal surfaces.

The standard changes described above also cause a change of the EX designation of motors that must also be specified on the motor nameplate. The following table lists some examples:

Section	Previous designation	New designation	
		(ATEX)	(IECEx)
	(until 2010)	(as of 2010)	(as of 2010)
With explosive gas/air mixtures	II2G Ex e II T3	II2G Ex e IIC T3 Gb	Ex e IIC T3 Gb
	II3G Ex nA II T3	II3G Ex nA IIC T3 Gc	Ex nA IIC T3 Gc
With explosive dust/ air mixtures	II2D Ex tD A21 IP65 T120°C	II2D Ex tb IIIC T120°C Db	Ex tb IIIC T120°C Db
	II3D Ex tD A22 IP54 T120°C	II3D Ex tc IIIB T120°C Dc	Ex tc IIIB T120°C Dc
	II3D Ex tD A22 IP65 T120°C	II3D Ex tc IIIC T120°C Dc	Ex tc IIIC T120°C Dc

With the designation of the explosion protection, you have to distinguish between the designation according to Directive, e.g. II3D, and the designation according to standard, e.g. Ex tc IIIC T120°C Dc.


II3D
Ex tc IIIC T120°C Dc
Designation according to standard
Designation according to directive

Equipment sold within the scope of the European Directive 94/9/EC must show the designation according to Directive 94/9/EC in addition to the standard designation. It is important to note that the Directive designation (e.g. with II) and the standard designation (e.g. with II) are two different designations.

As the Directive contains both, the gas and the dust atmospheres in category II, a motor is designated with II3D according to the Directive and IIIC according to the standard, for example.

The new standard designation is to clearly and explicitly specify the zone and the mixture, the individual drive is approved for.

4 Mechanical Installation

INFORMATION

Observe the safety notes in section 2 of these operating instructions for the mechanical installation.

4.1 Before you start

NOTICE

The mounting position for installation must correspond to the specifications on the nameplate.

Only install the drive if the following conditions are met:

- The specifications on the nameplate of the drive correspond to the supply system or the output voltage of the frequency inverter
- The drive is undamaged (no damage caused by transportation or storage)
- All transport locks have been removed.
- You are certain that the following requirements have been met:
  - Ambient temperature between -20 °C and +40 °C.

    Note that the temperature range of the gear unit may also be restricted (see gear unit operating instructions)

    Note that information on the nameplate may differ. The ambient conditions must comply with all the specifications on the nameplate.
  - No oil, acid, gas, vapors, radiation, etc.
  - Installation altitude max. 1000 m above sea level

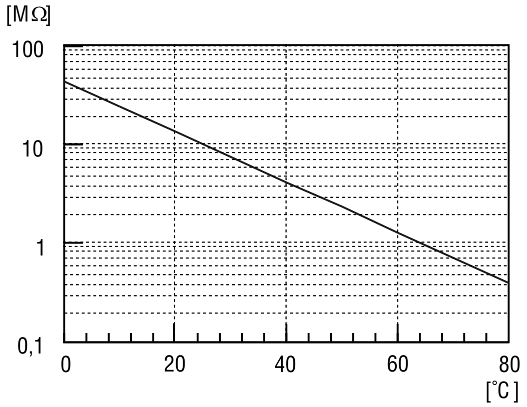
    Observe chapter "Electrical Installation" > "Ambient conditions during operation" > "Installation altitude".
  - Note the restrictions for encoders
  - Special design: Drive configured in accordance with the ambient conditions

The above mentioned information refers to standard orders. The conditions might be different when you order drives other than the standard. Observe any differing conditions in the order confirmation.

4.2 Long-term storage of motors

- Note that the service life of the lubricant in the ball bearings is reduced by 10% per year after the first year of storage.
- Before startup, you should re-lubricate the lubrication devices on motors that have been in storage for longer than 5 years. Observe the information on the motor lubricant plate.
- Check whether the motor has absorbed moisture as a result of being stored for a long time. Measure the insulation resistance for this purpose (measuring voltage 500 V).

The insulation resistance (see following figure) varies greatly depending on the temperature. The motor must be dried if the insulation resistance is not adequate.



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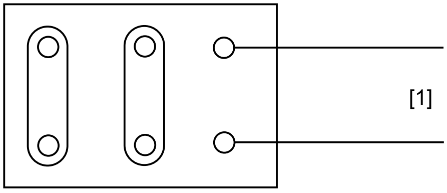
4.2.1 Drying the motor

Heat the motor:

- With hot air or
- Using isolation transformer
  - Connect the windings in series (see following figures)
  - Auxiliary AC voltage supply max. 10% of the rated voltage with max. 20% of the rated current

Connection in wiring diagram R13:



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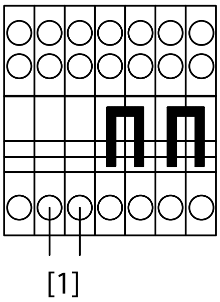
[1] Transformer

Connection in wiring diagram C13:



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[1] Transformer

The drying process is finished when the minimum insulation resistance has been exceeded.

In the terminal box check that:

- The inside is clean and dry
- The connections and fixing parts are free from corrosion
- The gasket and sealing surfaces are functioning
- The cable glands are tight, otherwise clean or replace them

4.3 Motor installation notes

⚠ CAUTION

Sharp edges due to open keyway.

Minor injuries.

- Insert key in keyway.
- Pull protective sleeve over shaft.

⚠ CAUTION

Improper mounting may result in damages to the motor.

Possible damage to property

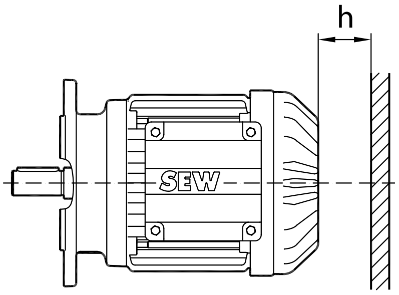
- Note the following:

NOTICE

The mounting position for installation must correspond to the specifications on the nameplate.

- Motor shaft ends must be thoroughly cleaned of anti-corrosion agents, contamination or similar (use a commercially available solvent). Do not allow the solvent to penetrate the bearings or shaft seals – this could damage the material.
- Mount the gearmotor only on a level, vibration-free and torsionally rigid support structure.
- Make sure the customer's counter-bearing is unobstructed and can move freely.
- Align the motor and the driven machine carefully in order to prevent the output shaft from being exposed to unacceptable strain. Observe the permitted overhung and axial forces.
- Do not jolt or hammer the shaft end.

- Check that there is sufficient clearance around the motor to provide for adequate cooling, and that the motor does not suck in warm air from other devices. Observe the following minimum clearance:



Motor type	h in mm
EDR.71, EDR.80	15
EDR.90, EDR.100	20
EDR.112, EDR.132	25
EDR.160	30
EDR.180	35
EDR.200, EDR.225	45

- Balance components for subsequent mounting on the shaft with a half key (motor shafts are balanced with a half key).
- For brakemotors with manual brake release, screw in the manual lever (for HR self-reengaging manual brake release).

INFORMATION

- If using belt pulleys:
  - Only use belts that do not build up an electrostatic charge.
  - Do not exceed the maximum permitted overhung load; for motors without gear units, see chapter "Overhung loads (page 126)".
- Motors in vertical mounting position (e.g. M4/V1) are equipped with a canopy /C as standard.
  On request, the motor can be delivered without canopy. In this case, you have to install a cover when you install the drive in the plant/machine in order to prevent objects from falling into the drive. Observe the requirements according to EN / IEC 60079-0 and EN / IEC 60079-7. This cover must not obstruct the cooling air supply.
- For mounting positions with the motor output shaft pointing upwards (e.g. M2/V3), you have to provide for a cover in order to prevent small objects from falling into the fan guard, see EN / IEC 60079-0. This cover must not obstruct the cooling air supply.

4.3.1 Installation in damp locations or in the open

- Use suitable cable glands for the incoming cable (use reducing adapters if necessary) according to the installation instructions.
- If possible, arrange the terminal box so that the cable entries are pointing downwards.
- Seal the cable entry properly.
- Clean the sealing surfaces of the terminal box and the terminal box cover carefully before re-assembly; replace embrittled gaskets.
- If required, touch up the corrosion protection (especially at the eyebolts).
- Check the degree of protection.
- Protect the shaft against corrosion with a suitable anti-corrosion agent.

4.4 Mounting tolerances

Shaft end	Flanges
Diameter tolerance according to EN 50347 • ISO j6 with Ø ≤ 28 mm • ISO k6 with Ø ≥ 38 mm up to ≤ 48 mm • ISO m6 at Ø ≥ 55 mm • Center bore in accordance with DIN 332, shape DR..	Centering shoulder tolerance in accordance with EN 50347 • ISO j6 with Ø ≤ 250 mm • ISO h6 with Ø ≥ 300 mm

4.5 Assembling the input elements

Input elements that are mounted on the motor shaft end, e.g. pinions, must be warmed up prior to assembly in order to prevent damages to the encoder of stand-alone motors.

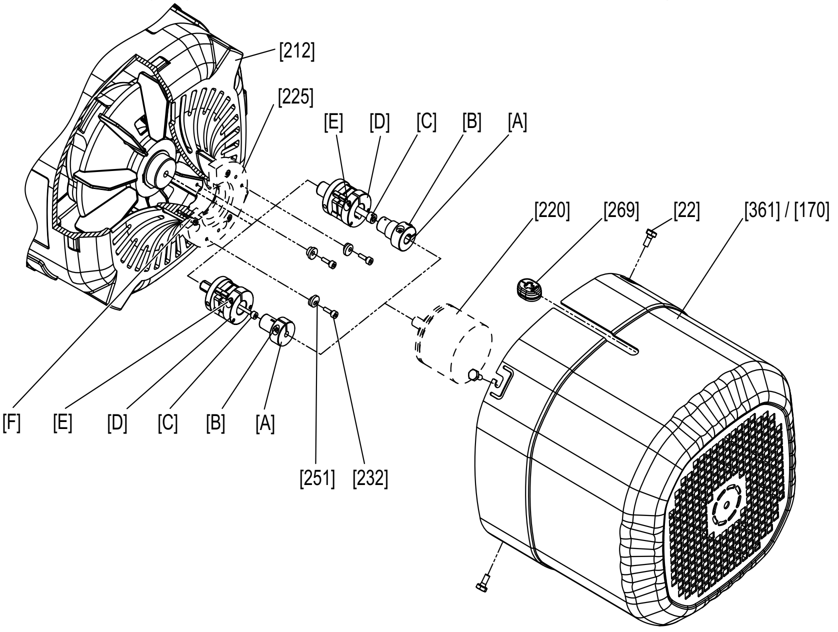
4.6 Non-SEW encoder mounting

If a drive was ordered with non-SEW encoder, SEW-EURODRIVE will deliver the drive with enclosed coupling. You must not connect the coupling for operation without non-SEW encoder.

4.7 Connecting XV.A encoder mounting adapter to EDR.71 – 225 motors

If you have ordered the XV.A encoder mounting adapter, the adapter and the coupling are enclosed with the motor and are to be assembled by the customer.

The following figure shows how to assemble the coupling and the adapter:



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[22]	Screw
[170]	forced cooling fan guard
[212]	Fan guard with encoder mount
[220]	Encoder
[225]	Intermediate flange (not with XV1A)
[232]	Screws (only with XV1A and XV2A)
[251]	Conical spring washers (only with XV1A and XV2A)
[361]	Extended fan guard
[269]	Grommet
[A]	Adapter
[B]	Retaining screw
[C]	Central retaining screw
[D]	Coupling (spread- or solid shaft coupling)
[E]	Retaining screw
[F]	Screw

1. If available, remove cover [361] or forced cooling fan guard [170].
2. **For XV2A and XV4A:** Remove intermediate flange [225].
3. Screw in the coupling [D] into the encoder bore of the motor shaft with the screw [C].

   EDR.71 – 132: Tighten the screw [C] with a tightening torque of 3 Nm [26,6 lb-in].

   EDR.160 – 225: Tighten the screw [C] with a tightening torque of 8 Nm [70,8 lb-in].
4. Push the adapter [A] on the encoder [220] and tighten it with the retaining screw [B] with a tightening torque of 3 Nm [26.6 lb-in].

5. **For XV2A and XV4A:** Mount the intermediate flange [225] with the screw [F] with a tightening torque of 3 Nm [26.6 lb-in].
6. Push the encoder and the adapter on the coupling [D] and tighten the retaining screw [E] with a tightening torque of 3 Nm [26.6 lb-in].
7. **With XV1A and XV2A:** Arrange conical spring washers [251] with retaining screws [232] and place in annular groove of the encoder [220] and tighten with a tightening torque of 3 Nm (26.6 lb-in).
8. **For XV3A and XV4A:** Installation by the customer via the bores in the encoder plate.

4.7.1 XH.A encoder mounting adapter

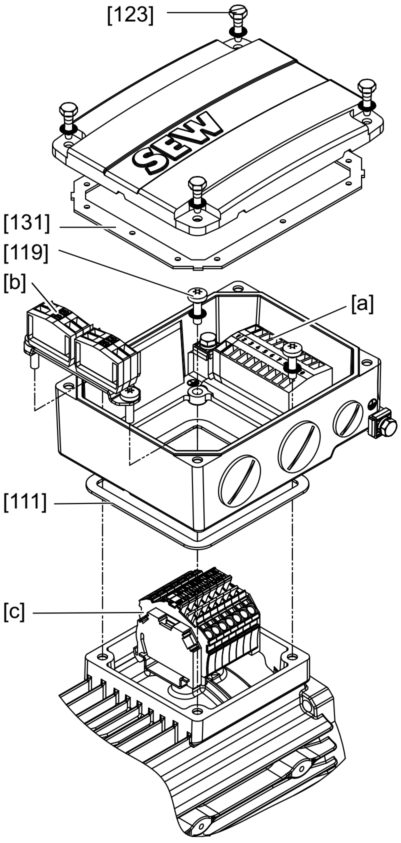
The XH1A, XH7A and XH8A encoder mounting adapters for hollow shaft encoders are premounted on delivery.

Proceed according to chapter "Motor and brake maintenance – preliminary work" (page 96) to mount the encoder.

4.8 Turning the terminal box

4.8.1 Terminal box with tension spring terminal power connections

The following figure shows the terminal box variant with tension spring terminal strip:



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[111]	Seal
[119]	Terminal box retaining screws + lock washers (4 x each)
[123]	Terminal box cover retaining screws + lock washers (4 x each)
[131]	Seal
[a]	Terminal strip 1
[b]	Terminal strip 2 + retaining plate
[c]	Power terminal

The type and number of terminal strips varies with the terminal box design and the options.

Proceed as follows to turn the terminal box:

1. Loosen the screws [123] from the terminal box cover and remove the cover.
2. Loosen the retaining screws [119] and the terminal box.
3. Clean the sealing surfaces at the stator shoulder, the bottom and the cover of terminal box.
4. Check the gaskets [111 and 131] for damages and replace them if necessary.
5. Position the terminal box as desired.
6. If the terminal strip 2 [b] has been installed with the retaining screws of the terminal box [119], it must be mounted again to the face of the power terminal after the terminal box has been turned.

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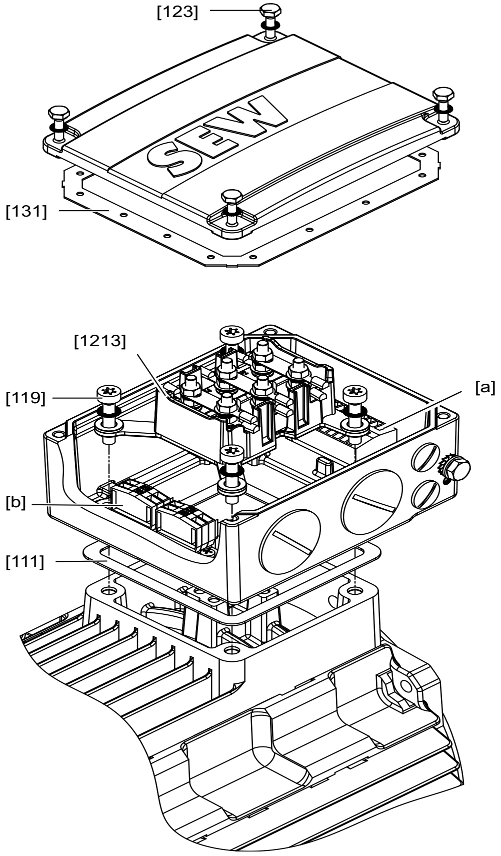
INFORMATION

Connection alternatives for 2 terminal strips [a] and [b] are listed in the appendix (page 159).

7. Fasten the bottom part of the terminal box with the screws [119] and the lock washers with one of the following tightening torques:
   - **EDR.71 – 132:** 5 Nm [44,3 lb-in]
   - **EDR.160 – 225:** 25.5 Nm [225.7 lb-in]
8. Fasten the terminal box cover with the screws [123] and the lock washers with the appropriate tightening torque. Make sure the gasket is seated properly.

4.8.2 Terminal box with terminal board and anti-twist frame

The following figure shows a terminal box with anti-twist frame:



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[111]	Seal
[119]	Terminal box retaining screws + lock washers (4 x each)
[123]	Terminal box cover retaining screws + lock washers (4 x each)
[131]	Seal
[a]	Terminal strip 1
[b]	Terminal strip 2
[1213]	Kit (1 anti-twist frame, 1 terminal board, 4 sleeves, 2 screws, 2 nuts)

The type and number of terminal strips varies with the terminal box design and the options.

Proceed as follows to turn the terminal box:

1. Loosen the screws [123] from the terminal box cover and remove the cover.
2. Remove the retaining screws [119] of the terminal box.
3. Clean the sealing surfaces at the stator shoulder, the bottom and the cover of terminal box.
4. Check the gaskets [111 and 131] for damages and replace them if necessary.
5. Take the unit consisting of terminal board and anti-twist frame from the terminal box.

   Remove any cables that are already connected before taking out the unit.
6. Position the terminal box as desired.
7. Turn the unit consisting of terminal board and anti-twist frame in the same way as the terminal box and put it back in.

   The terminal board designations U1, V1 and W1 must be pointing towards the cable outputs afterwards.
8. Fasten the bottom part of the terminal box with the screws [119] and the lock washers with one of the following tightening torques:
   - **EDR.71 – 132:** 5 Nm [44,3 lb-in]
   - **EDR.160 – 225:** 25.5 Nm [225.7 lb-in]
9. Re-connect any removed cables according to the following table:

Yellow	White	Brown
W2/T4	U2/T5	V2/T6
Black	Red	Blue
U1/T1	V1/T2	W1/T3

   Tighten the nuts on the connection bolts with the appropriate tightening torque (page 34).

INFORMATION

The connected cables must be free from bends and twists, etc.

Observe the correct order of the small connection accessories, see chapter "Motor connection via terminal board" (page 48).

10. Fasten the terminal box cover with the screws [123] and the lock washers with the appropriate tightening torque (page 34). Make sure the gasket is seated properly.

⚠ WARNING

Possible damage to the motor outputs when turning the terminal board.

Possible damage to property.

- To make sure that the cables have not been damaged, carry out an insulation test after re-assembly, see chapter "Long-term storage of motors" (page 23).

4.8.3 Tightening torques

The following table shows all the tightening torques required for this procedure:

Key number	Screw	Area of application	Tightening torque	
			in Nm	in lb-in
[2]	Terminal stud nut	M6 stud	3	26.6
		M8 stud	6	53.1
		M12 stud	15.5	137.2
[113]	Pan head screw DIN rail connection	EDR.71 – 132	5	44.3
[117]	Hex head screw grounding inside	EDR.71 – 132	4	35.4
		EDR.160	25.5	225.7
		EDR.180 – 225 (aluminum design)	25.5	225.7
		EDR.180 – 225 (gray-cast iron design)	50	442.5
[119]	Pan head screw of terminal box	EDR.71 – 132	5	44.3
		EDR.160 – 225	25.5	225.7
[123]	Hex head screw terminal box cover	EDR.71 – 132	4	35.4
		EDR.160	10.3	91.2
		EDR.180 – 225 (aluminum design)	10.3	91.2
		EDR.180 – 225 (gray-cast iron design)	25.5	225.7
[137]	Screw option terminal	EDR.71 – 225	1.8	16.0
[140]	Hex head screw grounding outside	EDR.71 – 225	4	35.4
[151]	Flat head screw option terminal	EDR.71 – 225	1	8.9
[632]	Pan head screw option terminal	EDR.71 – 225	1.8	16.0

4.9 Coating

NOTE ON EXPLOSION PROTECTION

SEW-EURODRIVE delivers the drives with a coating that complies with the requirements regarding the prevention of electrostatic charge according to EN / IEC 60079-0. If you recoat the motors or gearmotors, you have to observe the requirements regarding the prevention of electrostatic charge according to EN / IEC 60079-0 .

4.10 Additional features

The following additional features are used depending on the respective category, see the following table:

	Category 2	Category 3
2. Shaft end with optional cover	x	x
2. Shaft end without optional cover	x	x

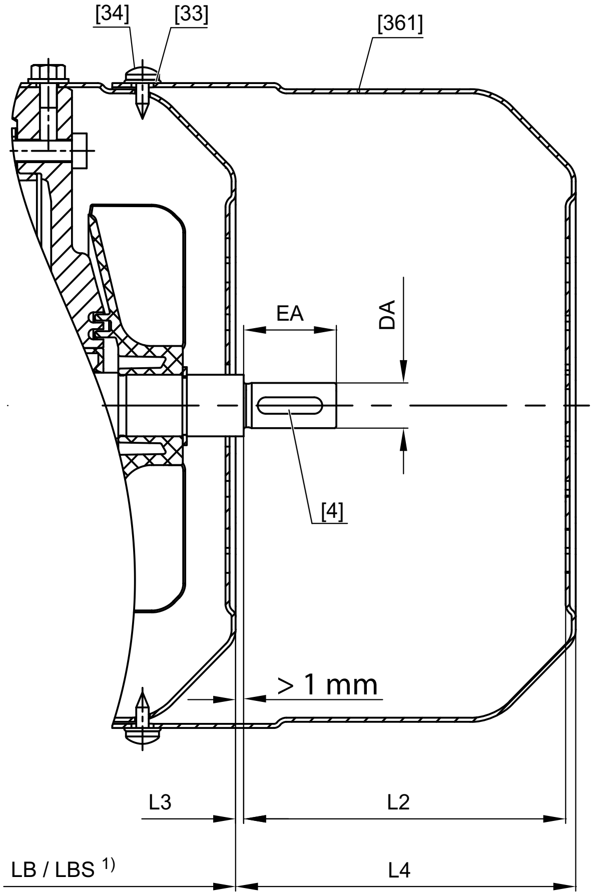
4.10.1 2. Shaft end

As standard, SEW-EURODRIVE supplies the accessory equipment "second shaft end" with inserted key and additional protection by means of a tape. No cover is supplied as standard. The cover can be ordered separately.

With optional cover Sizes EDR.71 – EDR.132 come equipped with a cover.

The following figure shows the dimensions of the covers:

Sizes EDR.71 – EDR.132



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[4]	Keyway		LB/LBS	Length of the motor/brakemotor
[33]	Washer		1)	Refer to the catalog for dimensions
[34]	Tapping screw		[361]	Extended fan guard

Motor size	DA	EA	L2	L3	L4
EDR.71	11	23	80	2	91.5
EDR.80	14	30	93	2	95.5
EDR.90	14	30	86.5	2	89
EDR.100	14	30	86.5	2	89
EDR.112/132	19	40	122.5	3.5	125

Observe the distances between the shaft shoulder and the fan housing as well as the overhung loads when you connect accessories.

The following table shows the distances between the shaft shoulder and the fan housing:

Motor size	Length of the 2. shaft end in mm	Distance between shaft shoulder and fan housing in mm
71	23	2
80	30	2
90	30	2
100	30	2
112	40	3.5
132	40	3.5

Without optional cover

Variants without cover must be provided with a cover by the customer.

Observe the impact resistance requirements according to EN / IEC 60079-0 when you select and mount the cover.

⚠ CAUTION

protective cover missing or incorrect.

Severe or fatal injuries.

- Only qualified personnel may mount the protective cover.
- Only start up the motor with the correct protective cover.

5 Electrical Installation

WARNING

Danger of electric shock.

Severe or fatal injuries!

- Note the following:

- It is essential to comply with the safety notes in chapter 2 during installation!
- Use switch contacts in utilization category AC-3 according to EN 60947-4-1 for switching the motor.
- When motors are powered by inverters, you must adhere to the wiring instructions issued by the inverter manufacturer.
- Observe the operating instructions of the inverter.

5.1 Additional regulations

The generally applicable installation regulations for low-voltage electric equipment (such as DIN IEC 60364, DIN EN 50110) must be complied with when setting up electrical machinery.

5.2 Wiring diagrams and terminal assignment diagrams

Connect the motor only as shown in the wiring diagram(s) included with the motor. Do not connect or start up the motor if the wiring diagram is missing. You can obtain the valid wiring diagrams free of charge from SEW-EURODRIVE.

5.3 Cable entries

The terminal boxes have metric threaded holes according to EN 50262 or NPT threaded holes according to ANSI B1.20.1-1983. All bores are equipped with explosion-proof closing plugs upon delivery.

In order to provide for a correct cable entry, you have to replace the closing plugs with cable glands with strain relief, that are certified for the use in the respective explosion-proof zone. Select the cable screw fitting according to the outer diameter of the cable used. For the tightening torque of the cable entry, refer to the operating/installation instructions or the EC prototype test certificate of the cable glands. The IP degree of protection of the cable entry must be at least as high as the IP degree of protection of the motor.

Only use connection glands with screw heads that fit into the existing counter sinking

The following table shows the sizes of the flat bottom counter sinking with the corresponding screw sizes:

Counter sinking in mm	Screw fitting
22	M16
30	M20
34	M25
41	M32
53	M40
62	M50
77	M63

All cable entries that are not required must be sealed off with a closing plug after completion of the installation in order to maintain the degree of protection. A closing plug may only be replaced with another explosion-proof closing plug.

5.4 Equipotential bonding

In accordance with EN 60079-14 and IEC 61241-14, it might be necessary to establish a connection to an equipotential bonding system. Observe the chapter "Electrical Installation" / "Improving the grounding (EMC)".

5.5 Wiring notes

Comply with the safety notes during installation.

5.5.1 Protecting the brake control system against interference

Unless they are shielded, brake cables must always be routed separately from other power cables with phased currents to protect brake controls against interference. Power cables with phased currents are in particular

- Output cables from frequency inverters and servo controllers, soft start units and brake units
- Supply cables for braking resistors and similar options

5.5.2 Protecting the motor protection devices against interference

To protect against interference by SEW motor protection devices (temperature sensors TF, winding thermostats TH):

- You may route separately shielded supply cables together with switched-mode power lines in one cable.
- You must not route unshielded supply cables together with switched-mode power lines in one cable.

5.6 Special aspects for operation with a frequency inverter

When motors are powered from inverters, you must observe the wiring instructions issued by the inverter manufacturer. Observe section "Operating Modes and Limit Values" and the operating instructions of the frequency inverter.

If a drive operated on the supply system has an earth-leakage current of more than AC/ DC 10 mA, one or more of the following conditions for the PE system must be fulfilled:

- The PE conductor has a minimum cross section of 10 mm^2 for copper or 16 mm^2 for aluminum over its entire length.
- If the PE conductor has a cross section smaller than 10 mm^2 (for copper) or 16 mm^2 (for aluminum), a second PE conductor with at least the same cross section must be installed up to the point where the PE conductor has a cross section of minimum 10 mm^2 (for copper) or 16 mm^2 (for aluminum).

  It might be necessary to equip the drive with a separate connection for a second PE conductor.

5.7 Improving the grounding (EMC)

For improved, low-impedance grounding at high frequencies, we recommend using the following connections: SEW-EURODRIVE recommends to use corrosion-resistant connection elements.

If you require an NF equipotential bonding in addition to the HF equipotential bonding, you can apply the conductor at the same point.

The "Improved grounding" option can be ordered as follows:

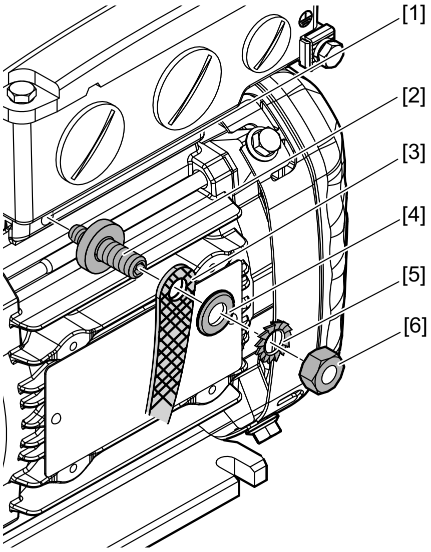
- completely premounted or as
- "connection element" kit for customer installation

INFORMATION

For further information regarding the grounding, refer to the SEW publication "Drive Engineering – Practical Implementation, EMC in Drive Engineering".

5.7.1 Size EDR.71S / M and EDR.80S / M

The following figure shows how to install the grounding:

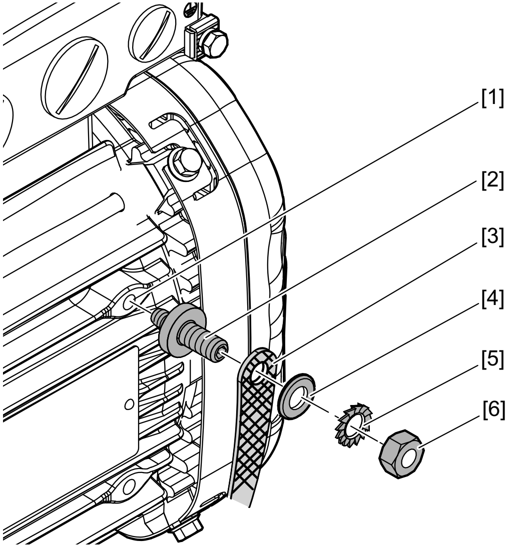


[1] Use of the pre-cast bore at the terminal-box recess/foot
[2] Grounding element with self-tapping screw DIN 7500 M6 x 10, customer M8 x 16, tightening torque 6 Nm (53.1 lb-in)
[3] Ground strap
[4] Disk ISO 7090
[5] Serrated lock washer DIN 6798
[6] M8 nut

You can order the complete connection element from SEW-EURODRIVE with part number 13633953.

5.7.2 Size EDR.90M / L

The following figure shows how to install the grounding:

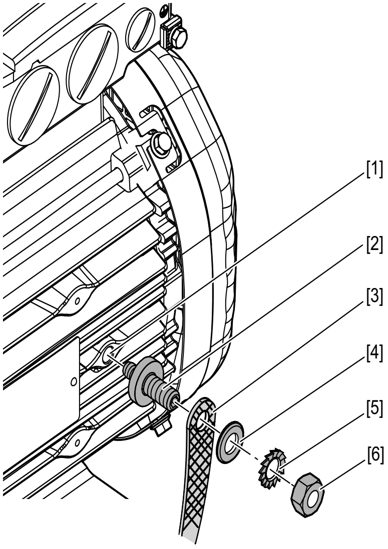


[1] Use of the pre-cast bore
[2] Grounding element with self-tapping screw DIN 7500 M6 x 10, customer M8 x 16, tightening torque 6 Nm (53.1 lb-in)
[3] Ground strap
[4] Disk ISO 7090
[5] Serrated lock washer DIN 6798
[6] M8 nut

You can order the complete connection element from SEW-EURODRIVE with part number 13633953.

5.7.3 Size EDR.100M

The following figure shows how to install the grounding:



[1] Use of the pre-cast bore

[2] Self-tapping screw DIN 7500 M6 x 10, customer M8 x 16, tightening torque 6 Nm (53.1 lb-in)

[3] Ground strap

[4] Disk ISO 7090

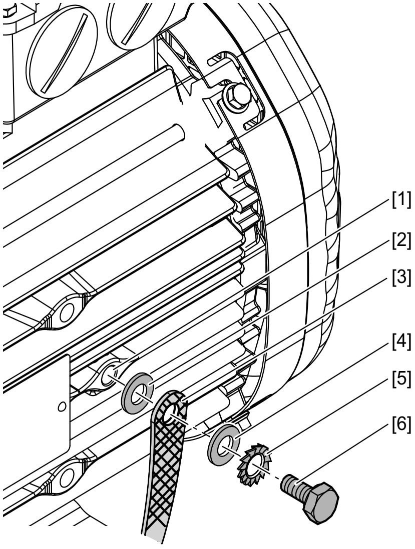
[5] Serrated lock washer DIN 6798

[6] M8 nut

You can order the complete connection element from SEW-EURODRIVE with part number 13633953.

5.7.4 Size EDR.100L – EDR.132

The following figure shows how to install the grounding:



[1] Use of tapped hole for lifting eyes

[2] Disk ISO 7090

[3] Ground strap

[4] Disk ISO 7090

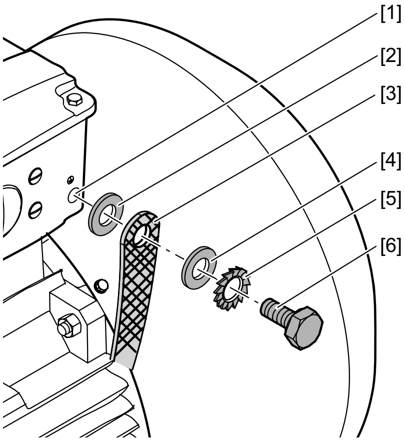
[5] Serrated lock washer DIN 6798

[6] Hex head screw ISO 4017 M8 x 16, tightening torque 6 Nm (53.1 lb-in)

You can order the complete connection element from SEW-EURODRIVE with part number 13633945.

5.7.5 Sizes EDR.160 – EDR.225

The following figure shows how to install the grounding:



[1]	Use of the tapped holes at the terminal box
[2]	Disk ISO 7090
[3]	Ground strap
[4]	Disk ISO 7090
[5]	Serrated lock washer DIN 6798
[6]	• Hex head screw ISO 4017 M8 x 16 (with aluminum terminal boxes size EDR.160 – 225), tightening torque 6 Nm (53.1 lb-in) • Hex head screw ISO 4017 M10 x 25 (with gray cast iron terminal boxes size EDR.160 – 225), tightening torque 10 Nm (88.5 lb-in)

You can order the complete connection element from SEW-EURODRIVE with part number 13633945.

For sizes EDR.160 – 225 with gray cast iron terminal boxes, the grounding is always pre-installed upon delivery.

For aluminum terminal boxes size EDR.160 – 225, you can order the "connection element" kit with part number 13633945.

5.8 *Special aspects in switching operation*

When the motors are used in switching operation, possible interference of the switchgear must be excluded by ensuring suitable wiring. According to EN 60204 (electrical equipment of machines), motor windings must have interference suppression to protect the numerical or programmable logic controllers. As it is primarily switching operations that cause interference, SEW-EURODRIVE recommends installing protective circuitry in the switching devices.

5.9 Ambient conditions during operation

5.9.1 Ambient temperature

Unless otherwise specified on the nameplate, you must observe the temperature range of -20 °C to +40 °C.

Motors intended for use in higher or lower ambient temperatures have specific designations on the nameplate.

If the motors are used at temperatures above +40 °C (max. +60 °C), the cables and cable glands must be suited for temperatures ≥ 90 °C.

Temperatures below -20 °C (max. -40 °C) require an anti-condensation heating. In addition, the cables and cable glands must me selected according to the respective temperature.

5.9.2 Installation altitude

The maximum installation altitude of 1000 m above sea level must not be exceeded.

5.9.3 Hazardous radiation

Motors must not be subjected to hazardous radiation (such as ionizing radiation). Contact SEW-EURODRIVE if necessary.

5.9.4 Harmful gas, vapor and dust

If used according to their designated use, explosion-proof motors are incapable of igniting explosive gases, vapors or dusts. However, explosion-proof motors may not be subjected to gases, vapors or dusts that endanger operational safety, for example through

- Corrosion
- Damage to the protective coating
- Damage to the sealing material, etc.

Gasket selection

If the motor is operated in environments with high environmental impact, such as increased ozone values, EDR motors can be equipped with high-quality gaskets. If you have doubts regarding the stability of the gaskets in connection with the respective environmental impacts, consult SEW-EURODRIVE.

5.10 Motors of categories 2GD and 3GD

5.10.1 General information

The explosion-proof SEW-EURODRIVE motors of the EDR.. series are designed for the following application zones.

Motor category	Operating range
2GD	Application in zone 1 or zone 21 and compliance with the design requirements for equipment group II, category 2GD.
3GD	Application in zone 2 or 22 and compliance with the design requirements for equipment group II, category 3GD.

5.10.2 Special indication "X"

If the special indication "X" appears after the certification number on the declaration of conformity or the prototype test certificate, this indicates the certificate contains special conditions for safe application of the motors.

5.10.3 Temperature classes

The motors are authorized for temperature classes T3 and T4. The temperature class of the motor variant 3GD is listed on the nameplate or in the declaration of conformity in the appendix.

The temperature class of the motor variant 2GD is listed in the type examination certificate that is enclosed with each motor.

5.10.4 Surface temperatures

The surface temperature of the motor can be found on the nameplate, the declaration of conformity or the prototype test certificate.

5.10.5 Protection against impermissibly high surface temperatures

Explosion-proof motors in ensure safe operation under normal operating conditions. The motor must be switched off securely in the case of overload to avoid the risk of impermissibly high surface temperatures.

The motor protection must comply with the respective approvals. There are 2 basic motor protection types. The respective options can be added if available:

Motor protection types	Option
A: Motor current circuit breaker	TF, KY or PT
B: PTC thermistor (PTC resistor: SEW designation: TF)	KY or PT

The following table shows the type of motor protection required according to the respective approval:

Category	2 (2GD / Gb Db)			3 (3GD / Gc Dc)		
Operation:	Supply system	Frequency inverter	Pulsed	Supply system	Frequency inverter	Pulsed
Labeling (see nameplate):	T_e time	T_e time	T_a time	–	–	–
Motor protection via	**A**	**B**	**B**	**A**	**B**	**B**

For permitted operating modes depending on the motor protection, see chapter "Permitted operating modes" (page 59). Brakemotors in category 3GD from SEW-EURODRIVE are equipped with PTC thermistors (TF) at the factory.

5.10.6 Protection only with motor protection switch

Note the following when installing the motor protection switch to EN 60947:

- **With category 2GD:** With starting current ratio I_A/I_N listed on the nameplate, the response time of the motor protection switch must be less than the t_E time of the motor.
- The motor protection switch must disconnect all poles in the event of a phase failure.
- The motor protection switch must be approved by a notified body and assigned a corresponding inspection number.
- The motor protection switch must be set to the rated motor current indicated on the nameplate. With category 2GD, the permitted nominal motor current is specified on the prototype test certificate.

5.10.7 Protection exclusively with PTC temperature sensors (TF)

The positive coefficient thermistor must be evaluated using a suitable device. Observe the applicable installation regulations.

▲ CAUTION

Damage to the temperature sensor due to excessive voltage.

Possible destruction of the temperature sensor.

- Do not apply any voltages > 30 V

The PTC thermistors comply with DIN 44082.

Resistance measurement (measuring instrument with $V \leq 2.5$ V or $I < 1$ mA):

- Standard measured values: 20 – 500 Ω, thermal resistance > 4000 Ω

The PTC thermistor (TF) is required in order to maintain a safe isolation and for thermal monitoring.

The evaluation function of the temperature monitoring must be activated in connection with the temperature sensor measuring circuit and must become effective in the event of an overtemperature.

5.10.8 Protection with motor protection switch and additional PTC thermistor

The conditions stated for exclusive protection with motor protection switches also apply here. Protection with positive temperature coefficient thermistors (TF) only represents a supplementary protection measure which is irrelevant to certification for potentially explosive atmospheres.

INFORMATION

Proof of the efficacy of the installed protective equipment is required prior to startup.

5.11 Notes on motor connection

INFORMATION

It is essential to comply with the valid wiring diagram! Do not connect or start up the motor if this wiring diagram is missing. You can obtain the valid wiring diagrams free of charge from SEW-EURODRIVE.

INFORMATION

The terminal box must be free of foreign objects, dirt and humidity. Unused cable entry openings and the terminal box itself must be closed so they are dust and water-proof.

Observe the following points when you connect the motor:

- Check cable cross section
- Arrange terminal links correctly
- Properly tighten connections and protective earth
- Check that the connection cables are not cramped in order not to damage the insulation.
- Observe clearances, see chapter "Electrical connection" (page 37)
- In the terminal box: Check winding connections and tighten them if necessary
- Perform the connection in accordance with the enclosed wiring diagram
- Avoid protruding wire ends
- Observe the specified direction of rotation

The following wiring diagrams can be obtained from SEW-EURODRIVE by specifying the motor order number (see chapter "Nameplate, type designation"):

Series	**Number of poles**	**Connection**	**Associated wiring diagram (designation/number) xx = placeholder for the version**
EDR.71-225	4	△ / ⅄	C13: 68 184 xx 08 R13: 68 001 xx 06

The motors are supplied and connected differently depending on the size and electrical design. Comply with the connection type specified in the following table:

Series	**Connection**
EDR.71 – EDR.132	• With V < 500 V and I < 17 A: Motor connection via tension spring terminal strip • With V > 500 V and I > 17 A: Motor connection via terminal board
EDR.160 – EDR.225	• Motor connection via terminal board

Observe the permitted air and creeping distances when connecting the supply system cable.

5.12 Motor connection via terminal board

The motors are supplied and connected differently depending on the electrical design. Arrange the cables and terminal links as shown in the wiring diagram and screw them on firmly. Observe the tightening torques specified in the following tables:

Motor sizes EDR.71 – EDR.132

Terminal stud Ø	Tightening torque of hex nut	Connection Customer Cross section	Variant	Connection type	Scope of delivery	PE connection stud Ø	Variant
M6	**3.0 Nm** (26.5 lb-in)	**≤ 6 mm^2** (AWG 10)	**1**	**Ring cable lug or solid wire**	**Small connection accessories enclosed in bag**	M5	2
M6	3.0 Nm (26.5 lb-in)	≤ 35 mm^2 (AWG 2)	1	Ring cable lug	Small connection accessories enclosed in bag	M5	2

Motor size EDR.160

Terminal stud Ø	Tightening torque of hex nut	Customer connection Cross section	Variant	Connection type	Scope of delivery	PE connection stud Ø	Variant
M6	3.0 Nm (26.5 lb-in)	≤ 6 mm^2 (AWG 10)	1	Ring cable lug or solid wire	Small connection accessories enclosed in bag	M8	2
M6	**3.0 Nm** (26.5 lb-in)	**≤ 35 mm^2** (AWG 2)	**1**	**Ring cable lug**	**Small connection accessories enclosed in bag**	M8	2
M8	6.0 Nm (53.1 lb-in)	≤ 70 mm^2 (AWG 2/0)	1	Ring cable lug	Small connection accessories enclosed in bag	M10	2

Motor sizes EDR.180 – EDR.225

Terminal stud Ø	Tightening torque of hex nut	Customer connection Cross section	Variant	Connection type	Scope of delivery	PE connection stud Ø	Variant
M6	3.0 Nm (26.5 lb-in)	≤ 6 mm^2 (AWG 10)	1	Ring cable lug or solid wire	Small connection accessories enclosed in bag	M8	2
M8	**6.0 Nm** (53.1 lb-in)	**≤ 70 mm^2** (AWG 2/0)	**1**	**Ring cable lug**	**Small connection accessories enclosed in bag**	M8	2
M12	15.5 Nm (137.2 lb-in)	35 mm^2 (AWG 2) – 95 mm^2 (AWG 3/0)	1	Ring cable lug	Connection parts pre-assembled	M12	2

The designs in bold print apply to S1 operation for the standard voltages and standard frequencies according to the data in the catalog. Other versions may have different connections, for example different terminal stud diameters and/or a different scope of delivery.

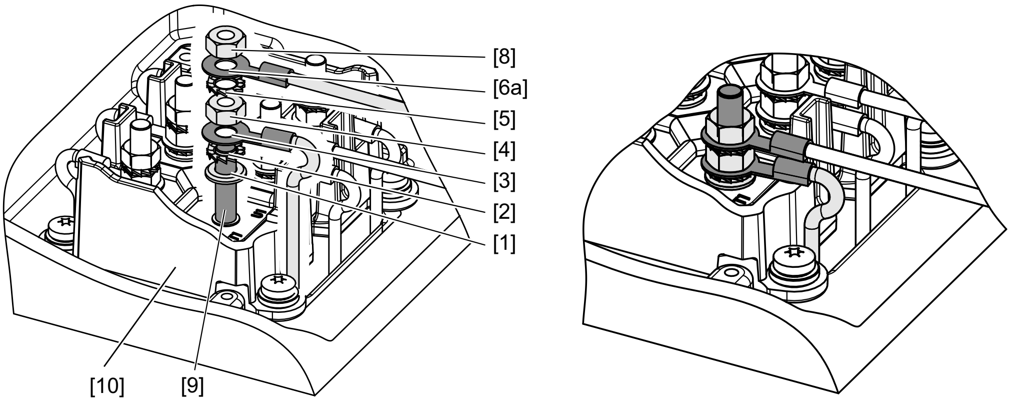
NOTE ON EXPLOSION PROTECTION

Tubular cable lugs according to DIN 46235 must not be used as they may not comply with the permitted minimum clearances.

5.12.1 Variant 1

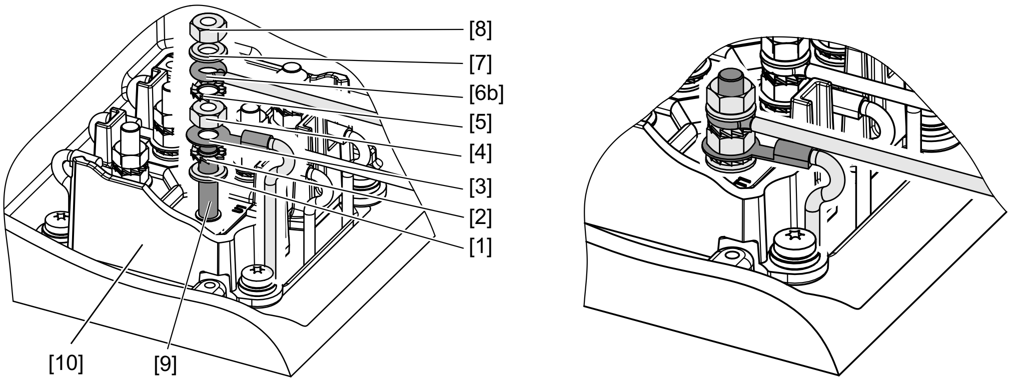
The following figure shows the 2 possible customer connections:

Customer connection with ring cable lug:



3989525643

Customer connection with solid wire:

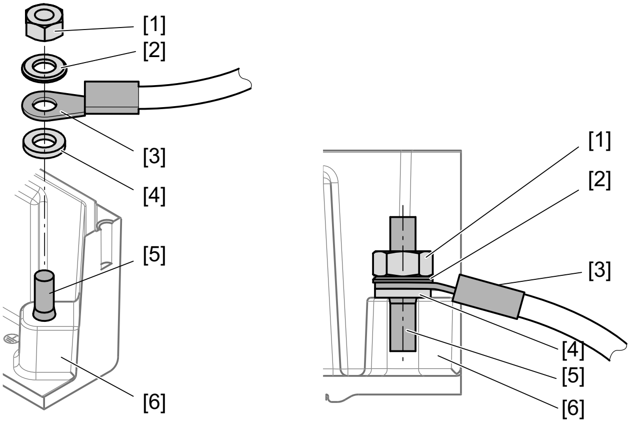


9007201889135499

[1]	Washer
[2]	Serrated lock washer
[3]	Winding connection with ring cable lug
[4]	Lower nut
[5]	Serrated lock washer
[6a]	Winding connection with ring cable lug, e.g. according to DIN 46237 or DIN 46234.
[6b]	Winding connection with solid wire, U-shaped
[7]	Serrated lock washer
[8]	Upper nut
[9]	Terminal stud
[10]	Anti-twist frame for ensuring the clearances

5.12.2 Variant 2

The following figure shows the variant for PE connection:



9007202075543051

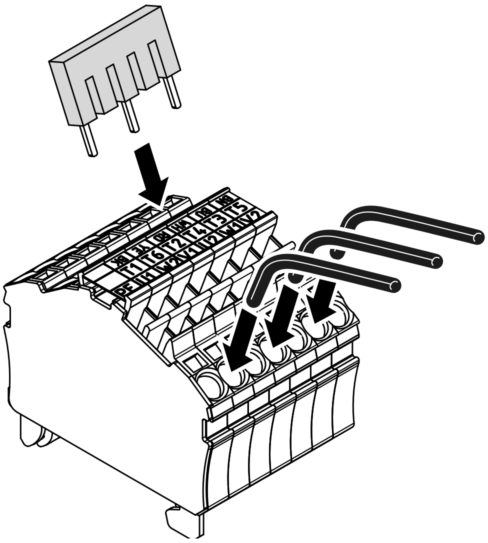
[1] Hex nut
[2] Washer
[3] PE conductor with cable lug
[4] Serrated lock washer
[5] Stud
[6] Terminal box

5.13 Connecting the motor via terminal strip

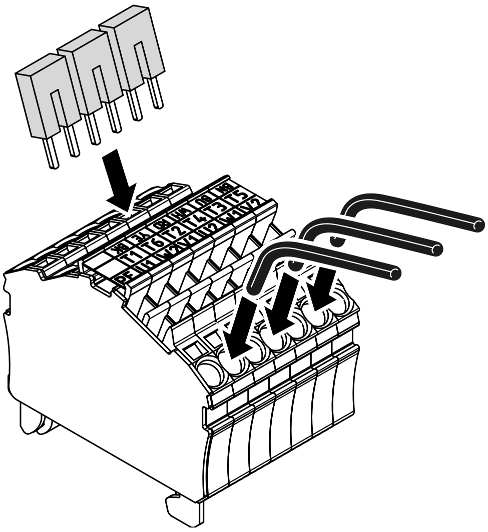
5.13.1 KCC terminal strip

- Perform the connection in accordance with the enclosed wiring diagram
- Check the maximum cable cross section:
  - 4 mm^2 (AWG 12) rigid
  - 4 mm^2 (AWG 12) flexible
  - 2,5 mm^2 (AWG 14) flexible with conductor end sleeve
- In the terminal box: Check winding connections and tighten them if necessary
- Strip-off length 10-12 mm

Arrangement of terminal links for ⅄ connection


PE
U1
W2
V1
U2
W1
V2
T1
T6
T2
T4
T3
T5
BK
YE
RD
WH
BU
BN

Arrangement of terminal links for △ connection


PE
U1
W2
V1
U2
W1
V2
T1
T6
T2
T4
T3
T5
BK
YE
RD
WH
BU
BN

5.14 Connecting the brake

The brake is released electrically. The brake is applied mechanically when the voltage is switched off.

⚠ WARNING

Risk of crushing if the hoist falls.

Severe or fatal injuries.

- Comply with the applicable regulations issued by the relevant employer's liability insurance association regarding phase failure protection and the associated circuit/ circuit modification!
- Connect the brake according to the provided wiring diagram.
- In view of the DC voltage to be switched and the high level of current load, it is essential to use either special brake contactors or AC contactors with contacts in utilization category AC-3 according to EN 60947-4-1.

5.14.1 Connecting the brake control

The DC disk brake is powered from a brake control system with protection circuit. The brake controller is installed in the control cabinet.

- **Check the cable cross sections – brake currents (see chapter "Technical Data")**
- Connect the brake controller according to the wiring diagram supplied with the brake.
- For brakemotors of category 3GD, the brake rectifier must be installed in the control cabinet.
- Brakes must not be opened electrically all the time while the motor is at standstill.

5.15 *Accessory equipment*

Connect accessory equipment as shown in the wiring connection diagram(s) provided with the motor. **Do not connect or start up the accessory equipment if the wiring diagram is missing.** You can obtain the valid wiring diagrams from SEW-EURODRIVE free of charge.

The following additional features are used depending on the respective category, see the following table:

Optional equipment	Category 2	Category 3
Temperature sensor /TF	x	x
Temperature sensor /KY	x	x
Temperature sensor /PT	x	x
Forced cooling fan /VE	–	x
Add-on encoders	–	x
Anti-condensation heater	x	x

5.15.1 Temperature sensor /TF

NOTICE

Damage of the temperature sensor due to excessive heat.

The drive system might be damaged.

- Do not apply voltages > 30 V to the TF temperature sensor.

The PTC thermistors comply with DIN 44082.

Resistance measurement (measuring instrument with V ≤ 2.5 V or I < 1 mA):

- Standard measured values: 20...500 Ω, thermal resistance > 4000 Ω

When using the temperature sensor for thermal monitoring, the evaluation function must be activated to maintain reliable isolation of the temperature sensor circuit. If the temperature reaches an excessive level, a thermal protection function must be triggered immediately.

If there is a second terminal box for the TF temperature sensor, you must connect the temperature sensor in that terminal box.

5.15.2 Temperature sensor /KY (KTY84-130)

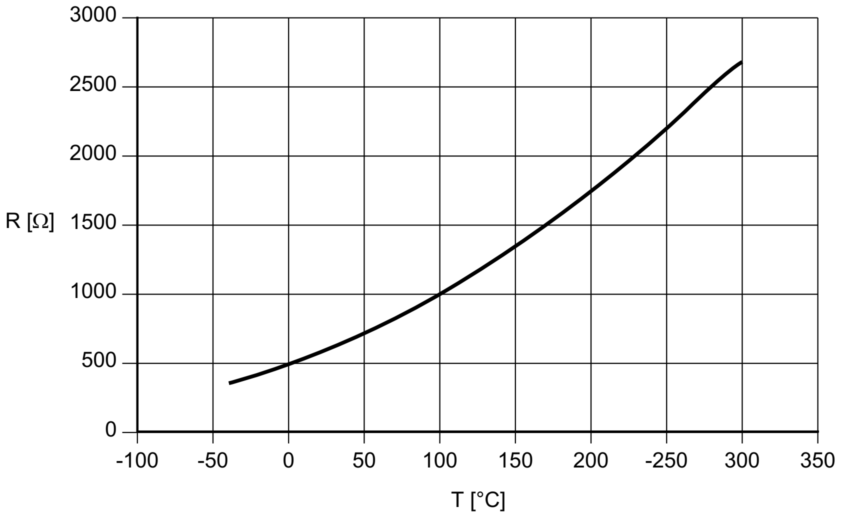
NOTICE

Excessive self-heating of the temperature sensor can damage the insulation of the temperature sensor.

The drive system might be damaged.

- Avoid currents > 4 mA in the circuit of the KTY.
- Observe the correct connection of KTY to ensure correct evaluation of the temperature sensor. Ensure correct polarity.

The characteristic curve in the following figure shows the resistance curve subject to the motor temperature with a measuring current of 2 mA and correct pole connection.



Technical data	KTY84 - 130
Connection	Red (+) Blue (-)
Total resistance at 20 - 25 °C	540 Ω < R < 640 Ω
Test current	< 3 mA

5.15.3 Temperature sensor /PT (PT100)

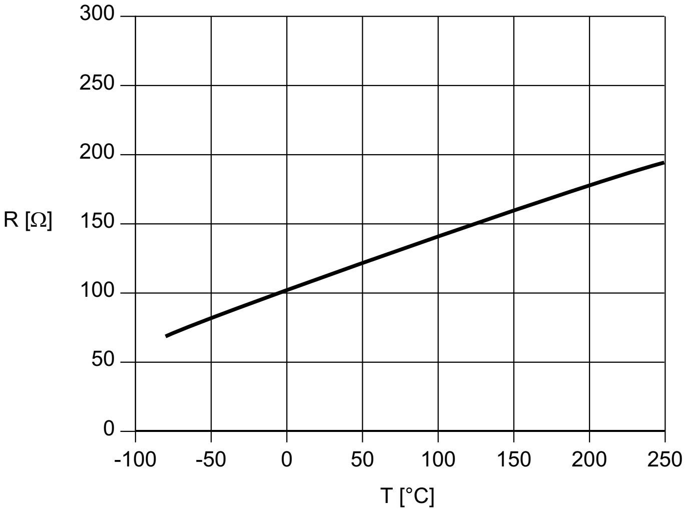
NOTICE

Excessive self-heating of the temperature sensor can damage the insulation of the temperature sensor.

The drive system might be damaged.

- Avoid currents > 4 mA in the circuit of the PT100.
- Observe the correct connection of PT100 to ensure correct evaluation of the temperature sensor. Ensure correct polarity.

The characteristic curve in the following figure shows the resistance curve subject to the motor temperature.



Technical data	PT100
Connection	Red/white
Resistance at 20 - 25 °C per PT100	107 Ω < R < 110 Ω
Test current	< 3 mA

5.15.4 Forced cooling fan /VE

Category II3GD motors can be equipped with a forced cooling fan as an option. For notes on connection and safe operation, refer to the operating instructions of the VE forced cooling fan (page 162).

V forced cooling fans must not be used with explosion-proof EDR.. AC motors.

5.15.5 Overview of add-on encoders

Refer to the wiring connection diagrams on information on how to connect incremental encoders:

Encoder	Motor size	Mounting device	Encoder type	Mounting type	Power supply	Signal	Wiring diagram
ES7S	EDR.71 – 132	ES7A for retrofitting	Incremental encoder	Shaft-centered	DC 7 – 30 V	1 Vss sin / cos	68 180 xx 08
ES7R	EDR.71 – 132	ES7A for retrofitting	Incremental encoder	Shaft-centered	DC 7 – 30 V	TTL (RS422)	68 179 xx 08
ES7C	EDR.71 – 132	ES7A for retrofitting	Incremental encoder	Shaft-centered	DC 4.5 – 30 V	HTL / TTL (RS 422)	68 179 xx 08
AS7W	EDR.71 – 132	ES7A for retrofitting	Incremental encoder	Shaft-centered	DC 7 – 30 V	1 Vss sin/cos (RS 485)	68 181 xx 08
AS7Y	EDR.71 – 132	ES7A for retrofitting	Incremental encoder	Shaft-centered	DC 7 – 30 V	1 Vss sin/cos + SSI	68 182 xx 07
EG7S	EDR.160 – 225	EG7A for retrofitting	Incremental encoder	Shaft-centered	DC 7 – 30 V	1 Vss sin / cos	68 180 xx 08
EG7R	EDR.160 – 225	EG7A for retrofitting	Incremental encoder	Shaft-centered	DC 7 – 30 V	TTL (RS422)	68 179 xx 08
EG7C	EDR.160 – 225	EG7A for retrofitting	Incremental encoder	Shaft-centered	DC 4.5 – 30 V	HTL / TTL (RS 422)	68 179 xx 08
AG7W	EDR.160 – 225	AG7A for retrofitting	Incremental encoder	Shaft-centered	DC 7 – 30 V	1 Vss sin/cos (RS 485)	68 181 xx 08
AG7Y	EDR.160 – 225	AG7A for retrofitting	Incremental encoder	Shaft-centered	DC 7 – 30 V	1 Vss sin/cos + SSI	68 182 xx 07
EV2C	EDR.71 – 225	XV1A required	Incremental encoder	Flange centered	DC 9 – 26 V	HTL	–
EV2R	EDR.71 – 225	XV1A required	Incremental encoder	Flange centered	DC 9 – 26 V	TTL (RS422)	–
EV2S	EDR.71 – 225	XV1A required	Incremental encoder	Flange centered	DC 9 – 26 V	1 Vss sin / cos	–
EV2T	EDR.71 – 225	XV1A required	Incremental encoder	Flange centered	DC 5 V	TTL (RS485)	–
EV7C	EDR.71 – 132	XV1A required	Incremental encoder	Shaft-centered	DC 4.5 – 30 V	HTL / TTL (RS 422)	–
EV7R	EDR.71 – 132	XV1A required	Incremental encoder	Shaft-centered	DC 7 – 30 V	TTL (RS422)	–
EV7S	EDR.71 – 225	XV1A required	Incremental encoder	Flange centered	DC 7 – 30 V	1 Vss sin / cos	–
AV7W	EDR.71 – 132	XV1A required	Incremental encoder	Shaft-centered	DC 7 – 30 V	1 Vss sin/cos (RS 485)	–
AV7Y	EDR.71 – 132	XV1A required	Incremental encoder	Shaft-centered	DC 7 – 30 V	1 Vss sin/cos + SSI	–

Encoder connection

When connecting the encoders to the inverters, observe the provided wiring diagrams and the information in these operating instructions as well as the operating instructions/ wiring diagrams of the respective inverter and the operating instructions/wiring diagrams provided with the non-SEW encoder if applicable. The wiring diagram is also provided with the technical data (page 158).

- Maximum cable length (inverter - encoder):
  - 100 m with a capacitance per unit length ≤ 120 nF/km
- Core cross section: 0.20 – 0.5 mm^2 (AWG 24 – 20)
- Use shielded cable with twisted pair conductors and apply shield over large area on both ends:
  - To the connection cover of the encoder, in the cable gland, or in the encoder plug
  - To the inverter on the electronics shield clamp or to the housing of the D-sub connector
- Install the encoder cables separately from the power cables, maintaining a distance of at least 200 mm.
- Compare the operating voltage with the permitted operating voltage range on the encoder nameplate. Deviations in the operating voltage may overheat and damage the encoder.
- Observe the clamping area of 5 to 10 mm of the cable gland of the connection cover. If you use cables with a different cross section, you have to replace the provided cable gland with a suitable other cable gland.
- The cable glands for the cable entry must meet the following conditions:
  - Cramping area is suitable for the respective cable
  - The IP level of the encoder connection is at least as high as the IP level of the actual encoder
  - Use is permitted according to the Ex category/zone
  - The cable is suitable for the respective ambient temperature range.
- Check the flawless state and the proper seat of the connection cover gasket.
- Tighten the screws of the connection cover with a tightening torque of 2 Nm [17.7 lb-in].

5.15.6 Anti-condensation heating

An anti-condensation heating is required when the explosion-proof motors are operated at temperatures below -20 °C.

Above -20 °C, when moisture condensation is expected, the anti-condensation heating is optional.

When connecting the anti-condensation heating, observe the permitted connection voltage for the strip heater according to the motor nameplate as well as the wiring diagram of the motor.

You must not energize the strip heater when the motor is switched-on.

6 Operating Modes and Limit Values

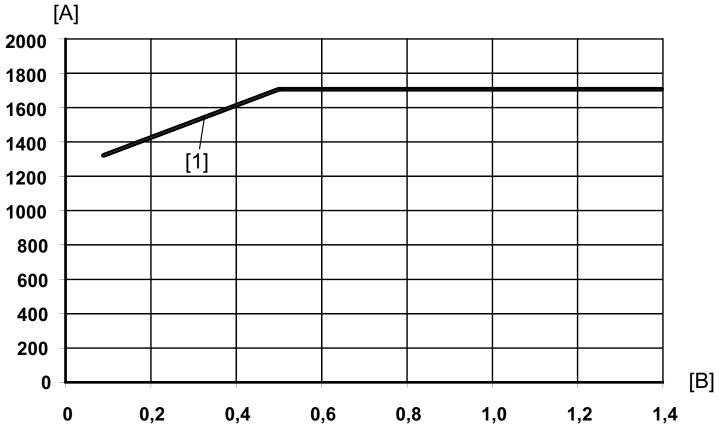
6.1 Permitted duty types

The following table shows the permitted duty types:

Category	**Protection level (EPL)**	**Protection against impermissibly high temperatures exclusively by**	**Permitted operating mode**
3GD	**Gc, Dc**	Motor protection switch	• S1
		PTC thermistor (TF)	• S1 • Heavy start • Frequency inverter operation • Soft-start unit
2GD **2G**	**Gb, Db** **Gb**	Motor protection switch	• S1
		PTC thermistor (TF)	• S1 • Frequency inverter operation (if certified)
		PTC thermistor (TF) as sole protection	• S1 • Frequency inverter operation (if certified)

6.1.1 Permitted voltage requirement in FI operation

Operating SEW motors on frequency inverters is permitted if the pulse voltages at the motor terminals indicated in the following figure are not exceeded.



[A] Permitted pulse U_{LL} in V
[B] Rise time in µs
[1] Permitted pulse voltage for EDR standard

NOTE ON EXPLOSION PROTECTION

The permitted maximum PE voltage of 1200 V must not be exceeded in IT system operation even in the event of an error.

NOTE ON EXPLOSION PROTECTION

If the permitted pulse voltage is exceeded, you have to provide for according measures to limit the pulse voltage. Consult the manufacturer of the frequency inverter.

Frequency inverters from SEW-EURODRIVE

When using frequency inverters from SEW-EURODRIVE on supply systems of up to 500 V, the maximally permitted limit values of the EDR.. motors are met.

The maximum permitted motor cable length is 100 m.

A braking resistor and a 4Q startup are mandatory. This prevents that in case of a fault in 1Q operation, the DC link voltage increases to an unacceptable level. External components, e.g. output choke, must not be used.

Frequency inverters from third party manufacturers

If the maximum permitted limit values cannot be met with frequency inverters from other manufacturers, you must take limiting measures. Consult the manufacturer of the frequency inverter.

IT system

In an IT system, an insulation fault between a phase and ground is tolerated. The ground connection of the motor could mean that the maximum permitted limit value for phase-to-ground of 1200 V is exceeded in regenerative operation. This limit value can be met by using a sine filter with DC link connection. The DC link connection also achieves the necessary filter effect against ground.

Regeneration

The use of regenerative power supply units with block-shaped (MDR type) or sinusoidal (MXR type) current along with corresponding options is possible without restrictions. The regenerative power supply unit prevents high DC link voltages and ensures that the limit values are not exceeded.

6.2 Use

NOTES ON EXPLOSION PROTECTION

- It is not permitted to connect more than one motor to one frequency inverter.
- The voltage at the motor terminal board must projected be to prevent overheating.
- If the motor voltage is too low (undercompensation), slip increases, which causes higher temperatures in the rotor of the motor.
- If the mechanical load is the same, operation on a frequency inverter causes a more significant motor temperature rise due to the harmonic content in current and voltage.

6.2.1 Motors of category 2GD

NOTES ON EXPLOSION PROTECTION

- The frequency inverter can only be operated with motors that are permitted for this operating mode according to the EC prototype test certificate.
- Verification that the motor voltage matches the specifications of the EC prototype test certificate must be provided during startup.

6.3 Safe operation of motors of category 2

The project planning is the basic requirement for the safe operation of explosion-proof motors. It is necessary to consider the following points:

- Checking the conditions of the typical application
- With deviations from the typical application: Calculate points D and E
- Adhere to the thermal torque limit characteristic curve
- Observe the dynamic limit torque
- Observe motor limit frequency
- Select the suitable frequency inverter
- Braking resistor must be used irrespective of the duty type
- Check the overhung and axial loads on the motor shaft of stand-alone motors
- Adhere to the maximum gear unit input speed, see nameplate
- Adhere to the maximum gear unit output torque, see nameplate

6.3.1 Motor terminal voltage

The calculation of the motor terminal voltage is an important component of project planning.

If the conditions differ from the typical application, you have to calculate the start of the field weakening f_D, the M_E and the current limit I_E.

6.3.2 Maximum permitted torques

The thermal torque limit characteristic curve shows the permitted maximum torque for continuous operation.

The values may be exceeded for brief periods if the effective operating point lies below the thermal limit characteristic curve.

The permitted maximum dynamic limit torque is determined by the short-term current limitation (150% $I_{C\ motor}$).

6.3.3 Maximum and minimum permitted frequencies

For the maximum and minimum frequencies, refer to the EC type examination certificate and/or the nameplate. These values must not be exceeded.

6.3.4 Motor/inverter assignment for motors in category 2GD

You must only use frequency inverters that comply with the requirements specified in the EC prototype test certificate.

$I_{N\,FrequencyInverter} \leq 2 \times I_{N\,Motor}$

Motor in ⅄ connection with motor voltage 230/400 V:

Motor type 2G / 2GD	P_N [kW]	n_{max} [rpm]	Inverter power kW																				
			0.25	0.37	0.55	0.75	1.1	1.5	2.2	3	4	5.5	7.5	11	15	22	30	37	45	55	75	90	110
EDRS71S 4	0.25	2415	x	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRS71M 4	0.37	2110	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRS80S 4	0.55	2410	–	–	x	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE80M 4	0.75	2465	–	–	-	x	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE90M 4	1.1	2455	–	–	–	–	x	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE90L 4	1.5	2395	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE100M 4	2.2	2455	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–
EDRE100LC 4	3	2480	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–
EDRE112M 4	3	1695	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–
EDRE132S 4	4	1730	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–
EDRE132M 4	5.5	1685	–	–	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–	–	–	–	–
DRE160S 4	7.5	1730	–	–	–	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–	–	–	–
EDRE160M 4	9.2	1755	–	–	–	–	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–	–	–
EDRE180S 4	11	2325	–	–	–	–	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–	–	–
EDRE180M 4	15	2325	–	–	–	–	–	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–	–
EDRE180L 4	18.5	2055	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–
EDRE200L 4	22	2375	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o	–	–	–	–
EDRE225S 4	30	2365	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o	–	–	–
EDRE 225M 4	37	2065	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o	–	–

x = recommended o = optionally permitted – = not permitted

Motor in △ connection with motor voltage 230/400 V:

Motor type 2G / 2GD	P_N [kW]	n_{max} [rpm]	Inverter power kW																				
			0.25	0.37	0.55	0.75	1.1	1.5	2.2	3	4	5.5	7.5	11	15	22	30	37	45	55	75	90	110
EDRS71S 4	0.25	2510	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRS71M 4	0.37	2465	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRS80S 4	0.55	2525	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE80M 4	0.75	2535	–	–	–	–	-	x	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE90M 4	1.1	2530	–	–	–	–	–	–	x	o	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE90L 4	1.5	2535	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–	–	–	–	–	–	–
EDRE100M 4	2.2	2530	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–
EDRE100LC 4	3	2556	–	–	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–	–	–	–	–
EDRE112M 4	3	1740	–	–	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–	–	–	–	–
EDRE132S 4	4	1760	–	–	–	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–	–	–	–
EDRE132M 4	5.5	1730	–	–	–	–	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–	–	–
EDRE160S 4	7.5	1750	–	–	–	–	–	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–	–
EDRE160M 4	9.2	1750	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	–	–	–	–	–	–
EDRE180S 4	11	2340	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–
EDRE180M 4	15	2330	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–
EDRE180L 4	18.5	2070	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–
EDRE200L 4	22	2370	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	–	–
EDRE225S 4	30	2380	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o
EDRE225M 4	37	2080	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o

x = recommended o = optionally permitted – = not permitted

INFORMATION

The speed can be reduced in case of gearmotors. If in doubt, refer to the nameplate for the permitted values.

MOVITRAC® B can be used for the basic control range. MOVITRAC® B can also be used for the field weakening range as of version 18225632.11[1]. MOVIDRIVE® B is only suitable for the basic control range. This means that the parameter *Maximum speed* must be limited to the start of the field weakening range.

6.3.5 Notes for safe operation

General information

Install the frequency inverter outside the potentially explosive atmosphere.

Thermal motor protection

Thermal motor protection is ensured by the following measures:

- Winding temperature monitoring through PTC thermistors (TF) built into the winding. The TF is monitored via an evaluation unit that complies with directive 94/9/EC and is labeled with Ex identification II(2)GD / II(2)G .
- Motor current monitoring according to the specifications of the EC prototype test certificate.
- Motor torque limitation according to the specifications of the EC prototype test certificate.

Overvoltage at the motor terminals

For FI-operated motors, observe chapter "Permitted voltage load in FI operation" (page 60).

EMC measures

The following components are permitted for the MOVIDRIVE® and MOVITRAC® frequency inverters:

- Line filters of the NF...-... series
- Output chokes of the HD... series
- Output filter (sine filter) HF..

  If an output filter is used, the voltage drop has to be compensated via the filter. Observe chapter "Using a sine filter" (page 78).

Gear units

When parameterizing FI-controlled gearmotors, you have to observe the n_{emax} and M_{amax} values of the gear unit.

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[1] Parameter P076 contains information about the firmware version.

6.4 Safe operation of motors of category 3

The project planning is the basic requirement for the safe operation of explosion-proof motors. It is necessary to consider the following points:

- Checking the conditions of the typical application
- With deviations from the typical application: Calculate points D and E
- Adhere to the thermal torque limit characteristic curve
- Observe the dynamic limit torque
- Observe motor limit frequency
- Select the suitable frequency inverter
- Braking resistor must be used irrespective of the duty type
- Check the overhung and axial loads on the motor shaft of stand-alone motors
- Adhere to the maximum gear unit input speed, see nameplate
- Adhere to the maximum gear unit output torque, see nameplate

6.4.1 Motor terminal voltage

The calculation of the motor terminal voltage is an important component of project planning.

If the conditions differ from the typical application, you have to calculate the start of the field weakening f_D, the M_E.

6.4.2 Maximum permitted torques

The thermal torque limit characteristic curve shows the permitted maximum torque for continuous operation.

The values may be exceeded for brief periods if the effective operating point lies below the thermal limit characteristic curve.

For the permitted maximum dynamic limit torque, refer to the motor table with the technical data in the "Explosion-Proof AC Motors" catalog, which available from SEW-EURODRIVE.

Permitted frequencies

Observe the maximum frequencies listed in the assignment tables for the motor/frequency inverter combinations. These values must not be exceeded.

Frequency inverter selection

Base your selection of the right frequency inverter on the table in chapter "Motor/inverter assignment for motors of category 3GD" (page 66).

6.4.3 Motor/inverter assignment for motors of category 3GD

In category 3GD environments, you can also use frequency inverters that have similar values with respect to output current and output voltage. For more information, refer to the standard EN 60079-15.

Motor in ⅄ connection with motor voltage 230/400 V:

Motor type 3GD	P_N [kW]	n_{max} [rpm]	Inverter power kW																				
			0.25	0.37	0.55	0.75	1.1	1.5	2.2	3	4	5.5	7.5	11	15	22	30	37	45	55	75	90	110
EDRS71S 4	0.25	2415	x	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRS71M 4	0.37	2110	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRS80S 4	0.55	2750	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE80M 4	0.75	2820	–	–	-	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE90M 4	1.1	2790	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE90L 4	1.5	2780	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE100M 4	2.2	2805	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–
EDRE100LC 4	3	2850	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–
EDRE112M 4	3	2460	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–
EDRE132S 4	4	2510	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–
EDRE132M 4	5.5	2445	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–
DRE160S 4	7.5	2500	–	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–
EDRE160M 4	9.2	2540	–	–	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–
EDRE180S 4	11	2545	–	–	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–
EDRE180M 4	15	2530	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o	–	–	–	–	–
EDRE180L 4	18.5	2535	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o	–	–	–	–
EDRE200L 4	22	2565	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o	o	–	–	–
EDRE225S 4	30	2565	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o	o	–	–
EDRE 225M 4	37	2560	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o	o	–

x = recommended o = optionally permitted – = not permitted

Motor in △ connection with motor voltage 230/400 V:

Motor type 3GD	P_N [kW]	n_{max} [rpm]	Inverter power kW																				
			0.25	0.37	0.55	0.75	1.1	1.5	2.2	3	4	5.5	7.5	11	15	22	30	37	45	55	75	90	110
EDRS71S 4	0.25	2900	–	x	o	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRS71M 4	0.37	2850	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRS80S 4	0.55	2900	–	–	–	x	o	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE80M 4	0.75	2910	–	–	–	–	-	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–	–
EDRE90M 4	1.1	2860	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–	–
EDRE90L 4	1.5	2920	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–	–
EDRE100M 4	2.2	2905	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–	–
EDRE100LC 4	3	2935	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–
EDRE112M 4	3	2545	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–	–
EDRE132S 4	4	2565	–	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–	–
EDRE132M 4	5.5	2535	–	–	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–	–
EDRE160S 4	7.5	2560	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–	–
EDRE160M 4	9.2	2570	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	–	–	–	–	–
EDRE180S 4	11	2580	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o	-	–	–	–
EDRE180M 4	15	2565	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o	–	–	–
EDRE180L 4	18.5	2575	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o	–	–
EDRE200L 4	22	2585	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o	–
EDRE225S 4	30	2575	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o	o
EDRE225M 4	37	2585	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	x	o	o

x = recommended
o = optionally permitted
– = not permitted

INFORMATION

The speed can be reduced in case of gearmotors. If in doubt, refer to the nameplate for the permitted values.

6.4.4 Notes for safe operation

General information

Install the frequency inverter outside the potentially explosive atmosphere.

Thermal motor protection

Only motors that are equipped with a positive temperature coefficient thermistor (TF) are permitted for operation on a frequency inverter to ensure that the permitted limit temperature is not exceeded. The positive temperature coefficient thermistor has to be evaluated using an appropriate device.

Overvoltage at the motor terminals

For FI-operated motors, observe section "Permitted voltage requirement in FI operation" (page 60)

EMC measures

The following components are permitted for the MOVIDRIVE® and MOVITRAC® frequency inverters:

- Line filters of the NF...-... series
- Output chokes of the HD... series
- Output filter (sine filter) HF..

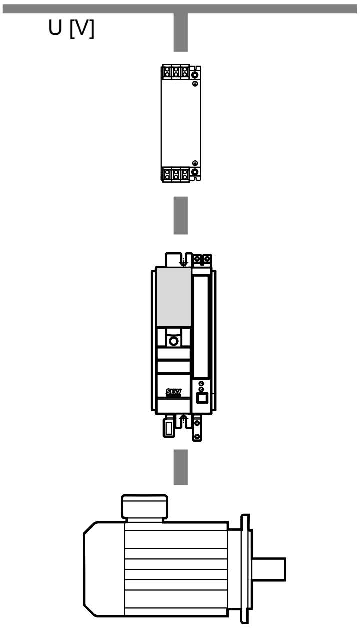
  If an output filter is used, the voltage drop has to be compensated via the filter. Observe chapter "Using a sine filter" (page 78).

Gear units

When parameterizing FI-controlled gearmotors, you have to observe the n_{emax} and M_{amax} values of the gear unit.

6.5 Typical application

The following conditions must be met:



- V_{line}: 400 V, line tolerance: ±5 %
- Installation with and without external NF line filter
- Frequency inverter:
  - MOVITRAC® B
  - MOVIDRIVE® B
- Installation without line choke and without sine filter
- Max. motor cable length 100 m
  Maximum permitted voltage: 10 V
- Rated motor voltage: 219 - 241 V / 380 - 420 V or 230 / 400 V, 50 Hz

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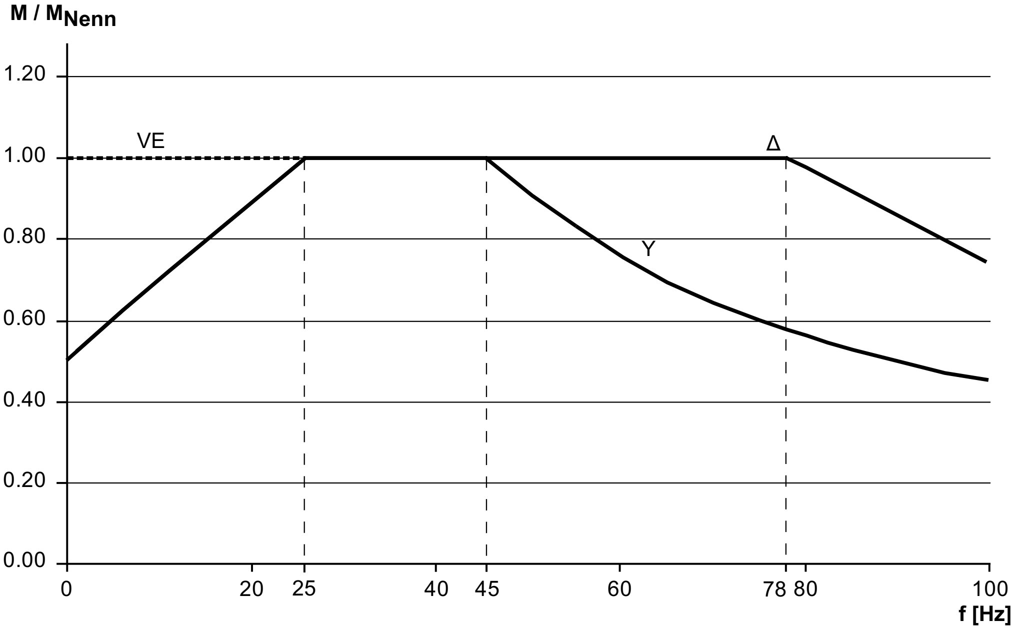
The thermal torque limit curves are based on the assumption that all conditions of a typical application are fulfilled.

The motor terminal voltage must only be dimensioned if the conditions of a typical application are not met.

6.5.1 Category 3

The following diagram shows the typical limit curve for category 3. For the exact values, refer to the nameplate.



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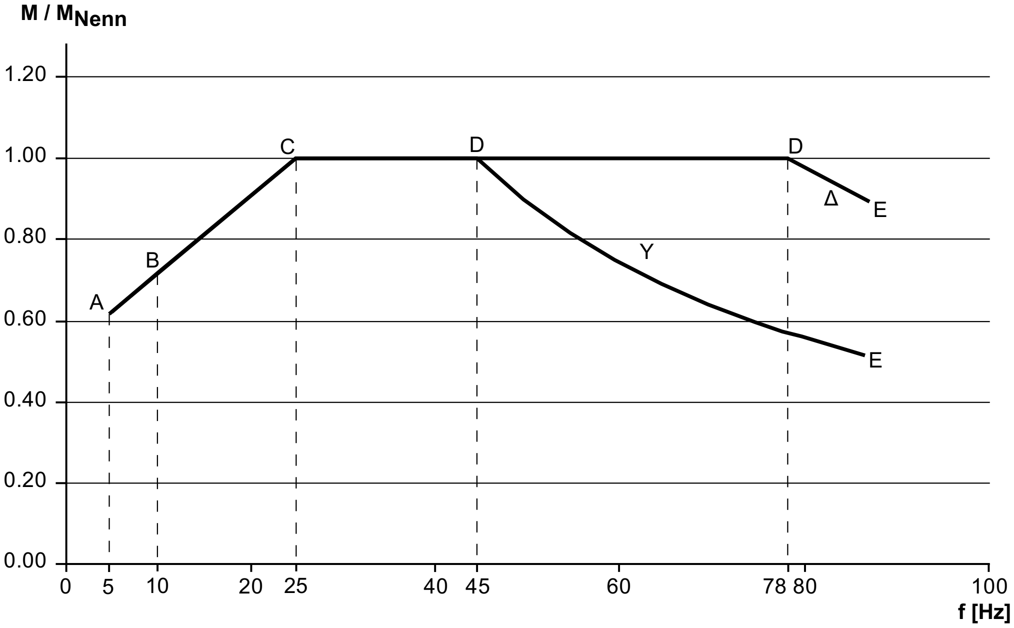
6.5.2 Category 2

The following diagram shows the typical limit curve for category 2. For the exact values, refer to the nameplate.



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Points A, B and C

These 3 points limit the torque in the lower speed range in order to protect the from overheating due to the reduced cooling. They do not have to be projected. The variables are included in the startup software and are automatically assigned the permitted values during startup.

Points D, E

Field weakening begins at point D. Point E is the permitted limit speed. The startup software calculates both values for the typical application and sets the respective parameters.

6.6 Special application

If the conditions of the typical application are not met, the motor terminal voltage can deviate and, as a result, the motor can heat up excessively.

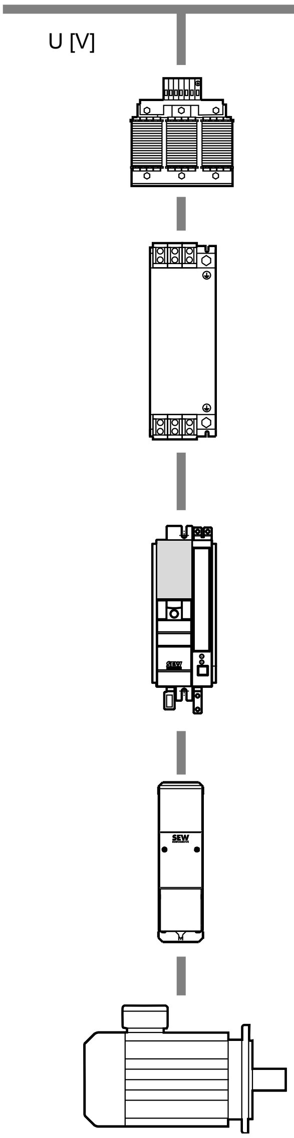
The deviating motor terminal voltage changes the shape of the thermal characteristic curve. The calculation and observation of points D (field weakening f_D and current limit I_D) and E (current limit I_E and torque M_E) during startup prevents the motor from overheating.

Procedure:

- Calculating the motor terminal voltage (page 72)
- Calculating the points D and E and the new thermal characteristic curve (page 76)

6.6.1 Calculating the motor terminal voltage

The calculation of the motor terminal voltage is an important component of project planning. The results must be considered during startup and corrected, if necessary, to prevent excessive heating of the motor.



V_{line}, observe tolerances

$$\Delta V_{LineChoke} = I_E \times \sqrt{3} \times \sqrt{(2 \times \pi \times L_{ND})^2 + R_{ND}^2}$$

$\Delta V_{LineFilter}$

Consult SEW-EURODRIVE regarding external NF.. filters

$$V_{E\_FI} = V_{Line} - \Delta V_{LineChoke} - \Delta V_{LineFilter}$$

$$V_{A\_FI} = 0.925 \times V_{E\_FI}$$

ΔV_{HF}

(see chapter "Using an SEW sine filter" (page 78))

ΔV_{Perm}

(See chapter "Voltage drop at the motor cable $\triangle V_{perm}$" (page 74))

$$V_{MotorTerm} = V_{A\_FI} - \Delta V_{HF} - \Delta V_{Perm}$$

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f_{base} = Base frequency in Hz
$f_{HF\ type}$ = Breakpoint when using a sine filter, in Hz
V_{E_FI} = Inverter input voltage in V
V_{A_FI} = Inverter output voltage in V
$\triangle V_{HF}$ = Voltage drop across sine filter in V
$\triangle V_{permitted}$ = Voltage drop across incoming motor cable in V

$\triangle V_{Line\ choke}$ = Voltage drop across line choke in V

$\triangle V_{line\ filter}$ = Voltage drop across line filter, in V
I_E = Line current in A
L_{ND} = Inductance of line choke in H
R_{ND} = Ohmic resistance of line choke in Ω
f_D = Start of the field weakening
$f_{D'}$ = Field weakening depending on the motor voltage

For inverter operation, the motor voltage is calculated as follows:

$$V_{Motor} = V_{Line} - (\Delta V_{LineFilter/Choke} + \Delta V_{FI} + \Delta V_{Outp.Filter} + \Delta V_{Cable})$$

Line voltage V_{line}

The line voltage is determined via direct measurement with multimeter or, alternatively, by reading off the DC link voltage ($V_{DC\ link}$) in the inverter ($V_{line} = V_{DC\ link}/1.35$).

Voltage drop at the line filter $\Delta\ V_{line\ filter}$

The voltage drop across the line filter depends on the design of the filter. For more detailed information, please refer to the documentation of the respective line filter.

Voltage drop at the line choke $\Delta\ V_{line\ choke}$

For optional SEW-EURODRIVE line chokes (ND...), the voltage drop can be calculated using the formula below.

$$\Delta V_{LineChoke} = I \times \sqrt{3} \times \sqrt{(2 \times \pi \times f \times L)^2 + R^2}$$

Since, in comparison to the inductance L, the ohmic resistance R is small enough to be neglected, the equation can be simplified to:

$$\Delta V_{LineChoke} = I \times \sqrt{3} \times 2 \times \pi \times f \times L$$

For the value of the inductance L, refer to the documentation of the the line choke.

Determining the inverter voltage

The inverter input voltage is determined by:

- measuring the mains voltage, or
- calculating the voltage according to the formula $V_{E\_FI} = V_{Line} - \Delta V_{LineChoke} - \Delta V_{LineFilter}$, or
- Reading-off the DC link voltage in the frequency inverter

Voltage drop at the output filter $\Delta\ V_{Outp.filter}$

The voltage drop at the output filter is proportional to the modulated fundamental output frequency and the motor current. It must be requested from the manufacturer of the output filter in individual cases. The voltage drop of SEW output filters can be read from the table.

$$\Delta V_{Outp.Filter} = I \times \sqrt{3} \times \sqrt{(2 \times \pi \times f \times L)^2 + R^2}$$

Since the resistance R is small enough to be neglected compared to the inductance L, the equation can be simplified to:

$$\Delta V_{Outp.Filter} = I \times \sqrt{3} \times 2 \times \pi \times f \times L$$

Filter				Choke	Voltage drop [V]					
					V = 400 V			V = 500 V		
		I_{N400}	I_{N500}	L	50 Hz	60 Hz	87 Hz	50 Hz	60 Hz	87 Hz
Type	BG	(A)	(A)	(mH)	(V)	(V)	(V)	(V)	(V)	(V)
HF 008-503	1	2.5	2	11	15	18	26	12	14	21
HF 015-503	1	4	3	9	20	24	34	15	18	26
HF 022-503	1	6	5	7	23	27	40	19	23	33
HF 030-503	1	8	6	5.5	24	29	42	18	22	31
HF 040-503	2	10	8	4.5	24	29	43	20	24	34
HF 055-503	2	12	10	3.2	21	25	36	17	21	30
HF 075-503	2	16	13	2.4	21	25	36	17	20	30
HF 023-403	3	23	19	1.6	20	24	35	17	20	29
HF 033-403	3	33	26	1.2	22	26	37	17	20	30
HF 047-403	4	47	38	0.8	20	25	36	17	20	29

INFORMATION

The voltage drop is negligible (current-compensated) for SEW-EURODRIVE output chokes (HD...).

INFORMATION

The voltage drop across the sine filter has to be compensated by the slope of the V/f characteristic curve. The slope is adjusted by changing the breakpoint.

Voltage drop at the motor cable Δ $V_{Mot.cable}$

The voltage drop of the motor cable depends on the motor current and the cross section, length and material of the cable. The voltage drop can be read from the following table.

cable cross section	Load with I [A]																	
	4	6	8	10	13	16	20	25	30	40	50	63	80	100	125	150	200	250	300
Copper	Voltage drop Δ V [V] with length = 100 m and ϑ = 70 °C																		
1.5 mm²	5.3	8	10.6 1)	13.3 1)	17.3 1)	21.3 1)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)
2.5 mm²	3.2	4.8	6.4	8.1	10.4	12.8 1)	16 1)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)
4 mm²	1.9	2.8	3.8	4.7	6.5	8.0	10	12.5 1)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)
6 mm²					4.4	5.3	6.4	8.3	9.9	2)	2)	2)	2)	2)	2)	2)	2)	2)	2)
10 mm²						3.2	4.0	5.0	6.0	8.2	10.2	2)	2)	2)	2)	2)	2)	2)	2)
16 mm²								3.3	3.9	5.2	6.5	7.9	10.0	2)	2)	2)	2)	2)	2)
25 mm²									2.5	3.3	4.1	5.1	6.4	8.0	2)	2)	2)	2)	2)
35 mm²											2.9	3.6	4.6	5.7	7.2	8.6	2)	2)	2)
50 mm²														4.0	5.0	6.0	2)	2)	2)
70 mm²																	4.6	2)	2)
95 mm²																	3.4	4.2	2)
150 mm²																		2.7	3.3
185 mm²																			2.7

1) This value is not recommended by SEW-EURODRIVE.

2) Load not permitted according to IEC 60364-5-52.

INFORMATION

The voltage drop at the cable is compensated by the IxR compensation. SEW-EURODRIVE frequency inverters adjust this value in the "Automatic calibration ON" mode every time the frequency inverter is started. In order to provide for a voltage reserve in the frequency inverter for this compensation, you have to take into account the voltage loss via the motor cable.

Voltage drop at the inverter V_{FI}

The voltage drop at the inverter is determined by:

- the voltages across the rectifier path
- the voltages at the output stage transistors
- the principle of converting supply voltage into DC link voltage and into the rotating field voltage
- the anti-overlap times resulting from the clocking of the output stage and the missing voltage-time areas
- the modulation process
- the load state and the energy dissipation of the DC link capacitors

To simplify the calculation, use the value of 7.5 % of the supply input voltage. This value is to be taken as the maximum possible voltage drop at the inverter. This allows for a reliable project planning.

6.6.2 Calculation of points D and E

Field weakening point D

The field weakening point D is calculated according to the following formula:

$$f_{D'} = \frac{V_{Motor\ terminal\ voltage}}{V_{Rated\ motor\ voltage}} \times f_{base}$$

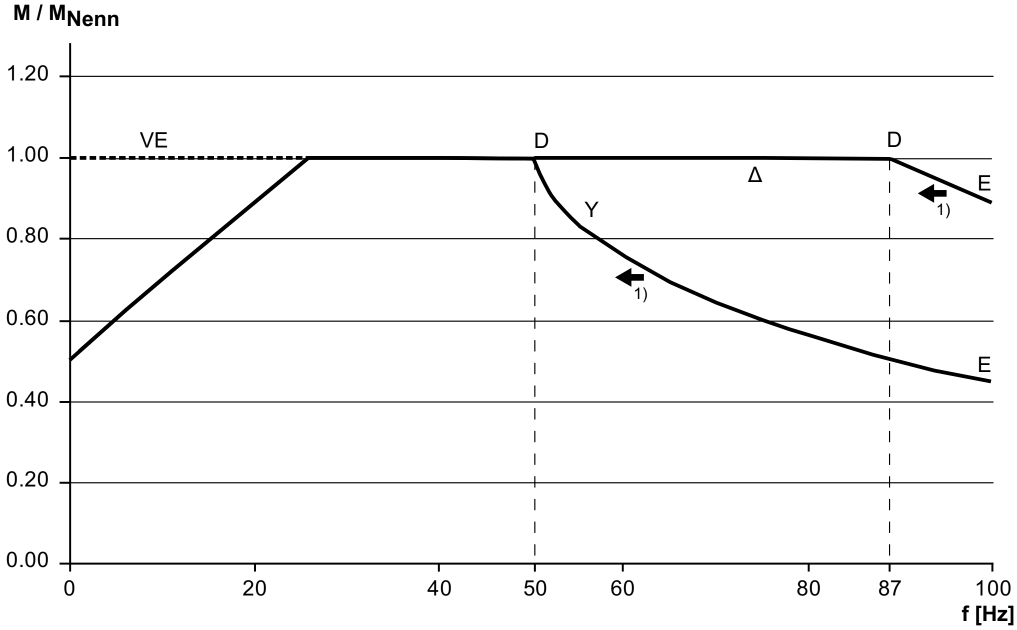
$$I_{D'} = I_D$$

Limit curves

The following characteristic curves are only valid if the terminal voltage corresponds with the rated motor voltage.

The following diagrams show the typical limit curves for category 2 and 3. For the exact values, refer to the nameplate:

Category 3, special application



1) The characteristic curve is shifted depending on the motor terminal voltage.

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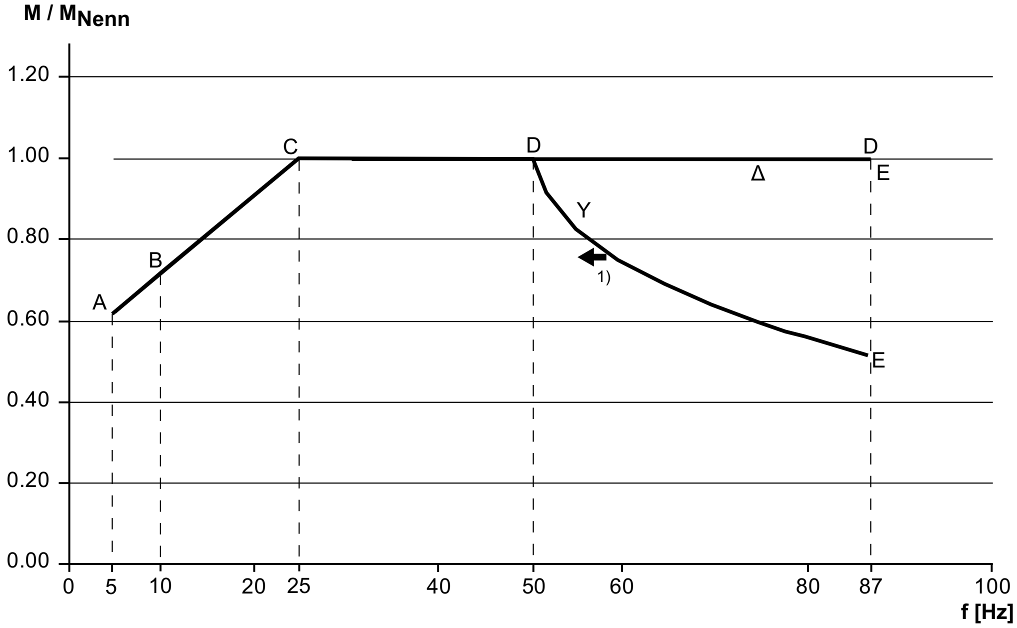
Category 2, special application



1) The characteristic curve is shifted depending on the motor terminal voltage.

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Torque reduction point E

The torque reduction point E is calculated according to the following formula:

$$M_{E'} = \frac{f_{D'}}{f_E} \times M_D$$

Valid for category 2:

$$I_{E'} = I_E - \left| \frac{I_D - I_E}{f_D - f_E} \right| \times (f_D - f_D')$$

The values for motors of category 2 are specified in the EC prototype test certificate.

6.6.3 Using a sine filter

For the calculation of the voltage drop, refer to chapter "Motor terminal voltage" (page 72).

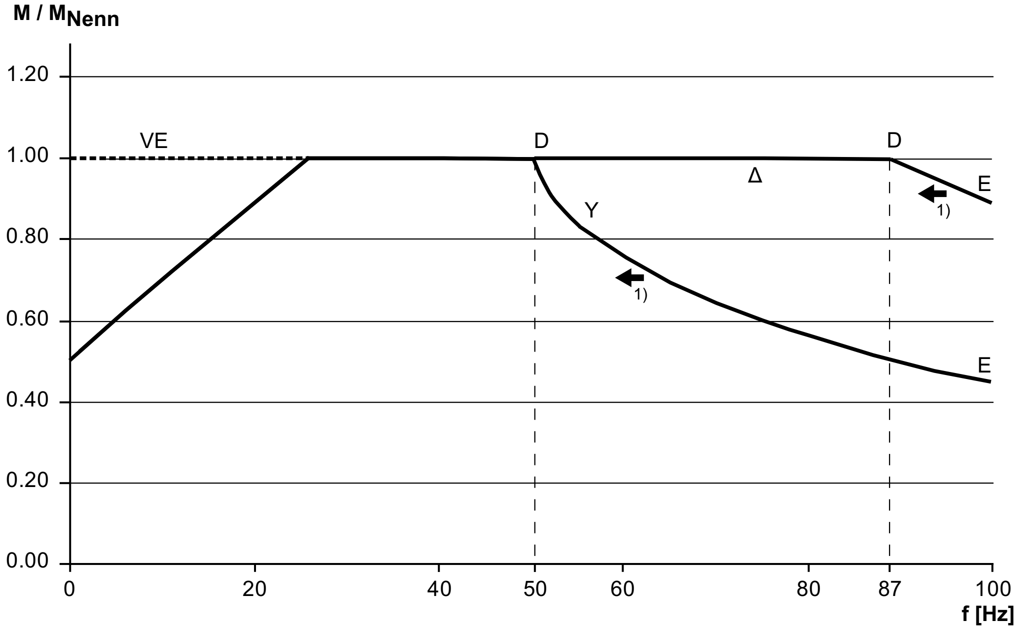
Field weakening point D

The field weakening point D is calculated according to the following formula:

$$f_{D'} = \frac{V_{A\_FI} - \Delta V_{per}}{V_{Rated\ motor\ voltage} + \Delta V_{HF}} \times f_{base}$$

Current $I_{D'}$ corresponds to I_D.

Category 3, special application



1) The characteristic curve is shifted depending on the motor terminal voltage.

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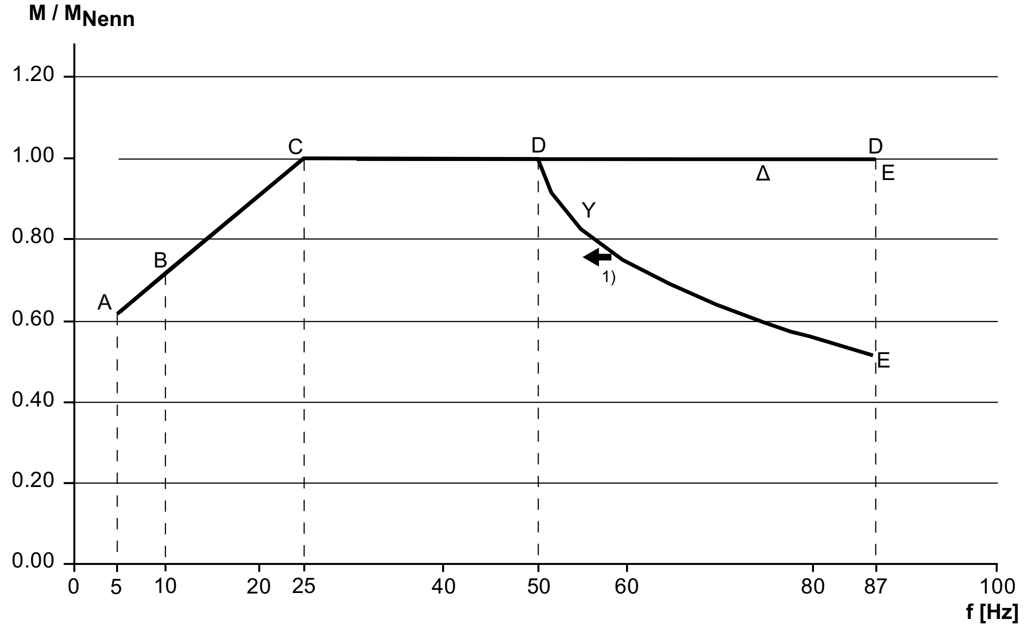
Category 2, special application



1) The characteristic curve is shifted depending on the motor terminal voltage.

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Torque reduction point E

The torque reduction point E is calculated according to the following formula:

$$M_{E'} = \frac{f_{D'}}{f_E} \times M_D$$

Valid for category 2:

$$I_{E'} = I_E - \left| \frac{I_D - I_E}{f_D - f_E} \right| \times (f_D - f_{D'})$$

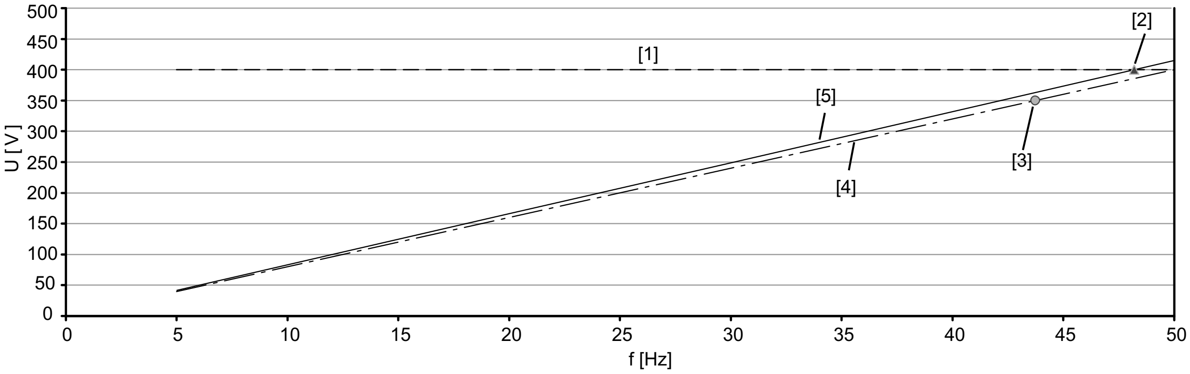
The values for motors of category 2 are specified in the EC prototype test certificate.

Breakpoint

The voltage drop across the sine filter has to be compensated by the slope of the V/f characteristic curve. The slope is adjusted by changing the breakpoint.

$$f_{type\_HF} = \frac{V_{Rated\ motor\ voltage}}{V_{Rated\ motor\ voltage} + \Delta V_{HF}} \times f_{base}$$

The calculated breakpoint must be entered instead of the nominal motor frequency during startup.



[1]	Inverter input voltage	[4]	Motor characteristic curve
[2]	TP_HF	[5]	FI characteristic curve
[3]	$f_{D'}$		

7 Startup

INFORMATION

- Observe the safety notes in section 2 during installation.
- In case of problems, refer to the section "Malfunctions".

⚠ WARNING

Danger of electric shock.

Severe or fatal injuries!

Note the following:

- Use switch contacts in utilization category AC-3 according to EN 60947-4-1 for switching the motor.
- When motors are powered by inverters, you must adhere to the wiring instructions issued by the inverter manufacturer.
- Observe the operating instructions of the inverter.

⚠ CAUTION

The surface temperatures on the drive can be very high during operation.

Danger of burns.

- Let the motor cool down before you start your work.

NOTICE

Limit the maximum speed and current at the inverter. For information on the procedure, refer to the documentation of the inverter.

7.1 Before startup

Before startup, make sure that:

- The drive is undamaged and not blocked
- Any transport locks have been removed
- The measures stipulated in chapter "Extended storage of motors" (page 23) are performed after extended storage periods
- All connections have been made properly
- The direction of rotation of the motor/gearmotor is correct
  - Motor rotating clockwise: U, V, W (T1, T2, T3) to L1, L2, L3
- All protective covers have been properly installed
- All motor protection equipment is active and set for the rated motor current
- There are no other sources of danger
- The lockable manual brake release is permitted

7.2 During startup

During startup, make sure that:

- The motor is running properly, which means
  - No overload,
  - No speed fluctuation,
  - No loud noises,
  - No unusual vibrations, etc.
- The braking torque corresponds to the respective application. Observe the "Technical Data" (page 126) chapter and the nameplate.

INFORMATION

On brakemotors with self-reengaging manual brake release, the lever must be removed after startup. A bracket is provided for storing the lever on the outside of the motor housing.

7.3 Parameter setting: Frequency inverters for category 2GD motors

INFORMATION

When you start up the frequency inverter, observe the operating instructions of the respective frequency inverter as well as the operating instructions of the gear unit if you use a gearmotor.

7.3.1 Before startup

Prior to startup, check that all the conditions for the typical application (page 69) are met. In the event of deviations from these conditions, you have to calculate points D and E (page 76) prior to startup. The effective operating point must be below the new thermal characteristic curve.

7.3.2 Startup procedure for MOVITRAC® B

Observe the following points during startup:

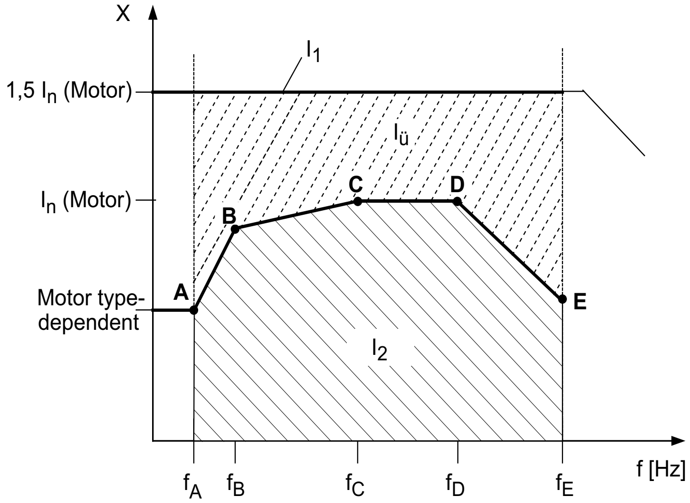
- Use the MOVITOOLS® MotionStudio software, version 5.70 or higher, for a guided startup procedure.
- The startup can only be activated in parameter set 1 due to current limitation function for motors of category 2.
- The system configuration only allows for individual drives.
- You can set either "V/f" or "vector-controlled" for the control mode.
- For the application, you can only select speed control. The options "Hoist", "DC braking" or "Flying start function" must not be used.
- The operating mode must always be set to "4-quadrant operation".
- The correct motor series must be selected in the "Motor type" window.
- In the "Motor selection" window, you must choose the unit category, the line voltage, the motor voltage, the connection type and the type of plant configuration in addition to the motor.

Current limit

In guided startup, the *Current limit* parameter is set to 150% $I_{N\ Mot}$ in the application window. This value must be reduced according to the permitted maximum output torque at the gear unit (M_{amax}).

Current monitoring

The parameters that need to be set for monitoring the current depend on the motor.



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I_n	Nominal current in A	X	Current limitation
I_1	permitted max. current in A	f	Frequency in Hz
I_2	permitted continuous current range in A	A, B, C, D, E	limiting points
I_O	Overload current in A		

After motor startup, current limitation I1 is active. Current limitation I2 determines the current that is permanently permitted. The current limitation function can be activated during startup or via parameter P560 *Current limitation Ex e motor* (the Ex e motor current limitation function is activated automatically for SEW-EURODRIVE motors of category 2 during startup).

The speed-dependent current limit is activated via the according motor selection and all the parameters of group P560 are set for points A to E, see the following parameter table. The values are also specified in the EC prototype test certificate.

Parameters	Point A	Point B	Point C	Point D	Point E
Frequency [Hz]	P561	P563	P565	P567	P570
Calculation	via startup software				
Current limit in % of $I_{N\ FI}$	P562	P564	P566	P568	P571
Calculation	via startup software				

In the event of deviations from the typical application, you have to recalculate and manually adapt the parameters for points D (field weakening f_D) and E (current limit I_E), see the following table:

Parameters	Point A	Point B	Point C	Point D	Point E
Frequency [Hz]	P561	P563	P565	P567	P570
Calculation	via startup software			is required + manual input	via startup software
Current limit in % of $I_{N\ FI}$	P562	P564	P566	P568	P571
Calculation	via startup software				is required + manual input

Maximum speed

The maximum motor speed must be limited in the "System limits" window. Observe the following when you set the parameter *maximum speed*:

- Maximum speed ≤ motor limit speed and
- Maximum speed ≤ maximum gear unit input speed n_{emax} (see gear unit nameplate)

Automatic adjustment

The parameter *automatic adjustment* is activated via guided startup. Thus, the frequency inverter sets parameter *IxR value* with each enable signal. A manual change is not permitted.

7.3.3 Startup procedure for MOVIDRIVE® B

INFORMATION

The MOVIDRIVE® B units are only suitable for the basic control range, i.e. the connected motor must not be operated in the field weakening range.

Observe the following points during startup:

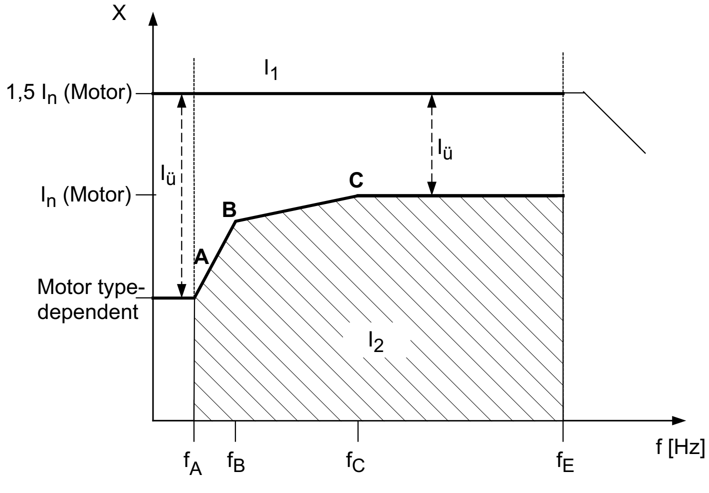
- The startup can only be activated in parameter set 1 due to current limitation function for motors of category 2.
- The first startup must always be a complete startup.
- The motor configuration only allows for individual drives. You can set either "V/f" or "vector-controlled" for the control mode.
- The correct motor series must be selected in the "Motor type" window.
- In the "SEW motor type 1" window, you must choose the unit category, the nominal motor voltage, the nominal motor frequency and the line voltage in addition to the motor.
- You can only select speed control for the application options. The options "Hoist", "DC braking" or "Flying start function" must not be used.
- The operating mode must always be set to "4-quadrant operation".

Current limit

In guided startup, the *Current limit* parameter is set to 150% $I_{N\ Mot}$ in the parameter window 1. This value must be reduced according to the permitted maximum output torque at the gear unit (M_{amax}).

Current monitoring

The parameters that need to be set for monitoring the current depend on the motor.



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I_n	Nominal current in A	X	Current limitation
I_1	permitted max. current in A	f	Frequency in Hz
I_2	permitted continuous current range in A	A, B, C, E	limiting points
I_O	Overload current in A		

After motor startup, current limitation **I_1** is active. Current limitation **I_2** determines the current that is permanently permitted. The current limitation function can be activated during startup or via parameter P560 *Current limitation Ex e motor* (the Ex e motor current limitation function is activated automatically for SEW-EURODRIVE motors of category 2 during startup).

The characteristic curve for MOVIDRIVE® is defined by operating points A, B and C. The parameters of group P560 are preset during startup, see following table. The values are also specified in the EC prototype test certificate.

Parameters	Point A	Point B	Point C
Frequency [Hz]	P561	P563	P565
Current limit in % of $I_{N\ FI}$	P562	P564	P566

Maximum speed

The maximum motor speed must be limited in the "System limits" window. Observe the following when you set the parameter *maximum speed*:

- Maximum speed ≤ start of the field weakening
- Maximum speed ≤ motor limit speed and
- Maximum speed ≤ maximum gear unit input speed n_{emax} (see gear unit nameplate)

Automatic adjustment

The parameter *automatic adjustment* is activated via guided startup. Thus, the frequency inverter sets parameter *IxR value* with each enable signal. A manual change is not permitted.

7.3.4 Overload protection

Operation above the permitted current range is permitted for 60 seconds. To prevent a sudden reduction of the current limitation and thus torque shocks, after about 50 seconds, the current is reduced to the permitted value along a ramp within 10 seconds. The current can again exceed the permitted range after a recovery time of 10 minutes. Operation below 5 Hz is permitted for 60 seconds. After this time has elapsed, the unit switches off with error F110 "Ex e protection" and performs an emergency stop as an error response.

The binary inputs P62_ can be parameterized to "Ex e current limitation active".

Preconditions for the output being set ("1" signal):

- Current limit 1 exceeded
- Recovery time not elapsed yet
- Operation < 5 Hz longer than 60 seconds

The current-time monitoring is not reset by an error reset.

The current-time monitoring is active both for mains operation and 24 V backup mode.

INFORMATION

If the mains is switched off without 24 V backup mode, the monitoring function is reset completely.

7.4 Parameter setting: Frequency inverters for category 3 motors

INFORMATION

When you start up the frequency inverter, observe the operating instructions of the respective frequency inverter as well as the operating instructions of the gear unit if you use a gearmotor.

7.4.1 Before startup

Prior to startup, check that all the conditions for the typical application (page 69) are met. In the event of deviations from these conditions, you have to calculate points D and E (page 76) prior to startup. The effective operating point must be below the new thermal characteristic curve.

7.4.2 Startup procedure for MOVITRAC® B

Observe the following points during startup:

- Use the MOVITOOLS® MotionStudio software, version 5.70 or higher, for a guided startup procedure.
- Startup and operation of the motors of category 3 is possible in parameter set 1 and 2.
- The system configuration only allows for individual drives.
- You can set either "V/f" or "vector-controlled" for the control mode.
- For the application, you can only select speed control and hoist application. The options "DC braking" or "Flying start function" must not be used.
- The operating mode must always be set to "4-quadrant operation".
- The correct motor series must be selected in the "Motor type" window.
- In the "Motor selection" window, you must choose the unit category, the line voltage, the motor voltage and the connection type in addition to the motor.

Current limit

In guided startup, the *Current limit* parameter is set to 150% $I_{N\ Mot}$ in the application window. This value must be reduced according to the permitted maximum output torque at the gear unit (M_{amax}).

Maximum speed

The maximum motor speed must be limited in the "System limits" window. Observe the following when you set the parameter *maximum speed*:

- Maximum speed ≤ motor limit speed and
- Maximum speed ≤ maximum gear unit input speed n_{emax} (see gear unit nameplate)

Automatic adjustment

The parameter *automatic adjustment* is activated via guided startup. Thus, the frequency inverter sets parameter *IxR value* with each enable signal. A manual change is not permitted.

7.4.3 Startup procedure for MOVIDRIVE® B

Observe the following points during startup:

- Use the MOVITOOLS® MotionStudio software, version 5.70 or higher, for a guided startup procedure.
- Startup and operation of the motors of category 3 is possible in parameter set 1 and 2.
- The first startup must always be a complete startup.
- The motor configuration only allows for individual drives. You can set either "V/f" or "vector-controlled" for the control mode.
- The correct motor series must be selected in the "Motor type" window.
- In the "SEW motor type 1" window, you must choose the unit category, the nominal motor voltage, the nominal motor frequency and the line voltage in addition to the motor.
- For the application options, you can only select "speed control" and the "hoist" function. The options "DC braking" or "Flying start function" must not be used.

Current limit

In guided startup, the *Current limit* parameter is set to 150% $I_{N\ Mot}$ in the parameter window 1. This value must be reduced according to the permitted maximum output torque at the gear unit (M_{amax}).

Maximum speed

The maximum motor speed must be limited in parameter window 2. Observe the following when you set the parameter *maximum speed*:

- Maximum speed ≤ motor limit speed and
- Maximum speed ≤ maximum gear unit input speed n_{emax} (see gear unit nameplate)

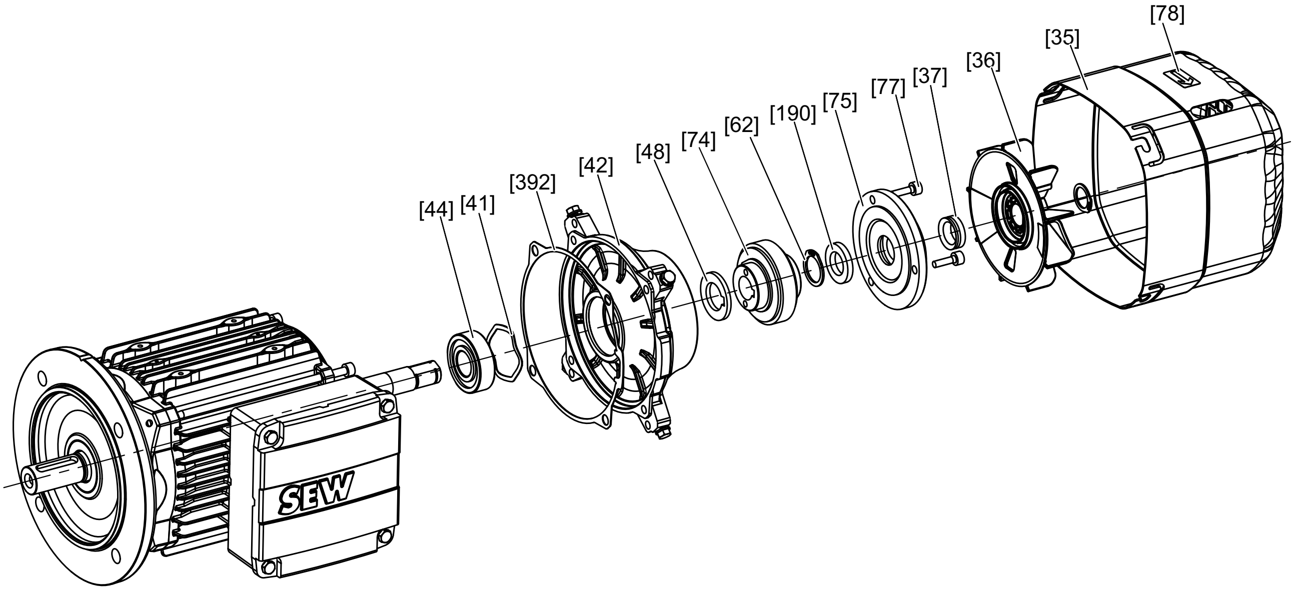
Automatic adjustment

The parameter *automatic adjustment* is activated via guided startup. Thus, the frequency inverter sets parameter *IxR value* with each enable signal. A manual change is not permitted.

The operating mode must always be set to "4-quadrant operation" (parameters P820/ P821).

7.5 *Changing the blocking direction of motors with backstop*

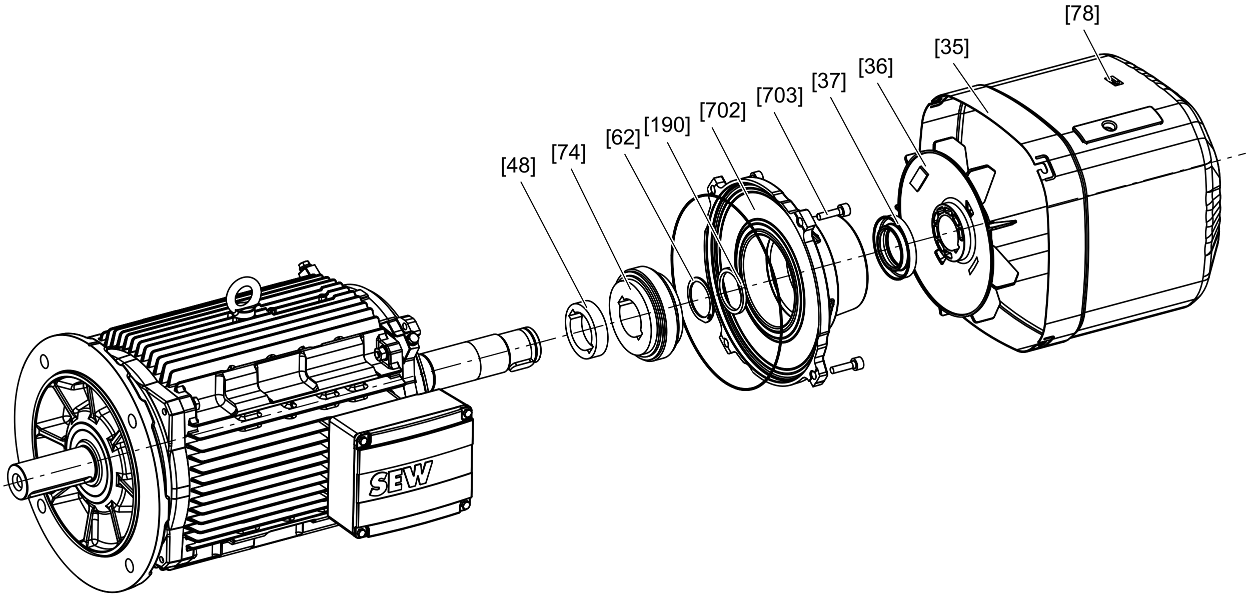
7.5.1 Structure of an EDR.71 – EDR.80 with backstop



1142858251

[35]	Fan guard	[44]	Grooved ball bearing	[77]	Screw
[36]	Fans	[48]	Spacing ring	[78]	Direction of rotation information tag
[37]	Sealing ring	[62]	Retaining ring	[190]	Felt ring
[41]	Shim	[74]	Complete sprag ring	[392]	Sealing
[42]	Backstop endshield	[75]	Sealing flange		

7.5.2 Structure of EDR.90 – EDR.225 with backstop (example)



1142856331

[35]	Fan guard	[62]	Retaining ring	[190]	Felt ring
[36]	Fan	[74]	Complete sprag ring	[702]	Backstop housing, complete
[37]	Sealing ring	[78]	Direction of rotation information tag	[703]	Machine screw
[48]	Spacing ring				

7.5.3 Changing the blocking direction

The backstop is used to block a direction of rotation of the motor. The direction of rotation is indicated by an arrow on the fan guard of the motor or on the gearmotor housing.

Observe the direction of rotation of the end shaft and the number of stages when you mount the motor to the gear unit. **Do not start up the motor in blocking direction (ensure correct connection of power supply with motor).** For inspection purposes, you can operate the backstop one time with half the motor voltage in the blocking direction:

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Before starting work, isolate the motor and, if installed, the forced cooling fan from the power supply.
- Safeguard against accidental startup.
- Carefully observe the steps described below.

Proceed as follows to change the blocking direction:

1. Remove forced cooling fan and incremental encoder (if installed).

   See chapter "Inspection/Maintenance" > "Motor and brake maintenance – preliminary work".
2. Remove flange cover or fan guard [35]
3. EDR.71 – 80: Remove the sealing flange [75].

   EDR.90 – 225: Completely remove the backstop housing [702]
4. Loosen the circlip [62]
5. Remove the wedge element ring [74] via screws in the forcing threads or using a puller
6. Spacing ring [48], if provided, remains installed
7. Turn around wedge element ring [74], check the old grease and replace according to the specifications below and reinstall the wedge element ring.
8. Install circlip [62]

   ⚠ **NOTICE** Damages due to incorrect assembly

   Damage to the material

   - Do not exert pressure on or hit the wedge element train
9. EDR.71 – 80: Apply Hylomar to cover sealing flange [75] and install it. Replace felt ring [190] and sealing ring [37] if required

   EDR.90 – 225: Replace sealing [901], felt ring [190] and sealing ring [37] if required, and install the backstop housing [702].
10. Reinstall the removed parts.
11. Replace the label [78] indicating the direction of rotation

Lubricating the backstop

The backstop is supplied with the corrosion protection low-viscosity grease Mobil LBZ. If you want to use a different grease, make sure it complies with NLGI class 00/000, with a base oil viscosity of 42 mm^2/s at 40 °C on a lithium saponified and mineral oil base. The application temperature range is from -50 °C to +90 °C. See the following table for the amount of grease required.

Motor type	**71**	**80**	**90/100**	**112/132**	**160**	**180**	**200/225**
Grease quantity [g]	9	11	15	20	30	45	80

The tolerance regarding the grease level is ± 30%.

8 Inspection/Maintenance

⚠ WARNING

Risk of crushing if the hoist falls or in the event of uncontrolled unit behavior.

Severe or fatal injuries.

- Secure or lower hoist drives (danger of falling)
- Safeguard and/or protect the driven machine against touching
- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Only use genuine spare parts in accordance with the valid parts list.
- Always install a new brake controller at the same time as replacing the brake coil.

⚠ CAUTION

The surface temperatures on the drive can be very high during operation.

Danger of burns.

- Let the motor cool down before you start your work.

NOTICE

For assembly, the ambient temperature and the oil seals themselves may not be colder than 0 °C, else the oil seals might be damaged.

Only SEW service staff, repair workshops or plants that provide the necessary expertise may repair or modify the motor.

Before re-startup of the motor, make sure that all regulations are complied with and document this with a label on the motor or a written test report.

Always perform safety and functional tests following all maintenance and repair work (thermal protection).

INFORMATION

Apply grease with a grease depot to the lip of the oil seals before assembly, see chapter "Oder information for lubricants and anti-corrosion agents" (page 146).

NOTES ON EXPLOSION PROTECTION

- Use only original spare parts from the relevant and valid spare parts lists; otherwise, the explosion-poof approval for the motor will become void.
- The routine test must be repeated whenever motor parts relating to explosion protection are replaced.
- Ensure that the motor is assembled correctly and all openings have been plugged after service and maintenance work.
- Clean motors in explosion-proof areas regularly. Prevent dust from building up higher than 5 mm.
- Clean the optional VE forced cooling fan at regular intervals. Prevent dust from building up higher than 5 mm. Observe the operating instructions of the forced cooling fan.
- Explosion protection is largely dependent on the IP enclosure. Therefore, always check that the seals are fitted correctly and in perfect condition when performing any work on the machine.
- Explosion protection can only be ensured if motors are serviced and maintained correctly.
- If you repaint the motors or gearmotors, you have to observe the requirements regarding the prevention of electrostatic charge according to EN / IEC 60079-0, see chapter "Painting" (page 34).
- You have to use tie rods with a strength of 8.8 for motors of sizes EDR.71 to EDR.100 that are used for temperatures below -20 °C according to the nameplate.
- You have to use screws of strength class 8.8 for applications in the low temperature range from -20 °C to -40 °C.

8.1 Inspection and maintenance intervals

The following table lists the inspection and maintenance intervals:

Unit / unit part	Time interval	Required steps
BE brake	• **If used as a working brake:** At least every 3000 hours of operation1) • **If used as a holding brake:** Every 2 to 4 years, depending on operating conditions 1)	Inspecting the brake • Measuring the brake disk thickness • Brake disk, lining • Measuring and adjusting working air gap • Pressure plate • Carrier/gearing • Pressure rings • Sucking off any abrasion • Inspect the switch contacts and replace them if necessary (e.g. in case of burn-out)
Motor	• **Every 10,000 operating hours** 2)	Motor inspection: • Check rolling bearing and change if necessary • Replace oil seal • Clean the cooling air passages
Drive	• Varies 2)	• Touch up or renew the surfaces/anti-corrosion coating • if applicable, clean condensation drain hole at the bottom of the fan guard • Clean clogged bores

1) The amount of wear depends on many factors and may be high. The machine designer must calculate the required inspection/maintenance intervals individually in accordance with the project planning documents (e.g. "Project Planning for Drives").

2) The interval depends on outer influences and can be very short, e.g. in the event of high dust concentration in the environment.

If you open the motor during inspection/maintenance, you have to clean it before you close it.

8.1.1 Connection cables

Check the connection cable for damage at regular intervals and replace if necessary.

8.2 Bearing lubrication

8.2.1 Bearing lubrication EDR.71- EDR.225

The motor bearings generally come with lubrication for life.

8.3 Corrosion protection

With all explosion-proof brakemotors and all motors with /KS corrosion protection option in IP56 or IP66, you must replace the old Hylomar at the studs with new Hylomar during maintenance.

8.4 Motor and brake maintenance – preliminary work

WARNING

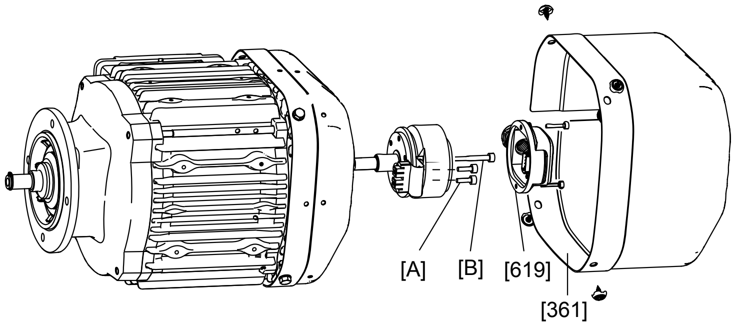
Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Before starting work, isolate the motor, brake, and if installed, the forced cooling fan from the power supply.
- Safeguard against accidental startup.

8.4.1 (Dis)assembling the incremental encoder of the EDR.71 – EDR.132

The following figure illustrates the disassembly procedure using the ES7. incremental encoder as an example:



2636070155

[361] Cover
[619] Connection cover
[A] Screws
[B] Retaining screw

Removing ES7./ AS7.

- Remove the cover [361].
- Unscrew and remove the connection cover [619]. Do not disconnect the encoder connection cable.
- Unfasten the expansion anchor by unscrewing the screws [A] from the cover grid.

  Always check the expansion anchor for cracks. Replace the expansion anchor in the event of any cracks, damages to the thread, or after 20 uses.
- Unscrew the central retaining screw [B] by about 2 to 3 turns and unfasten the spread shaft cone by tapping lightly on the head of the screw.
- Pull the encoder from the rotor bore.

  If the encoder is hard to loosen, you can loosen or counterhold the encoder shaft at the bore [F].

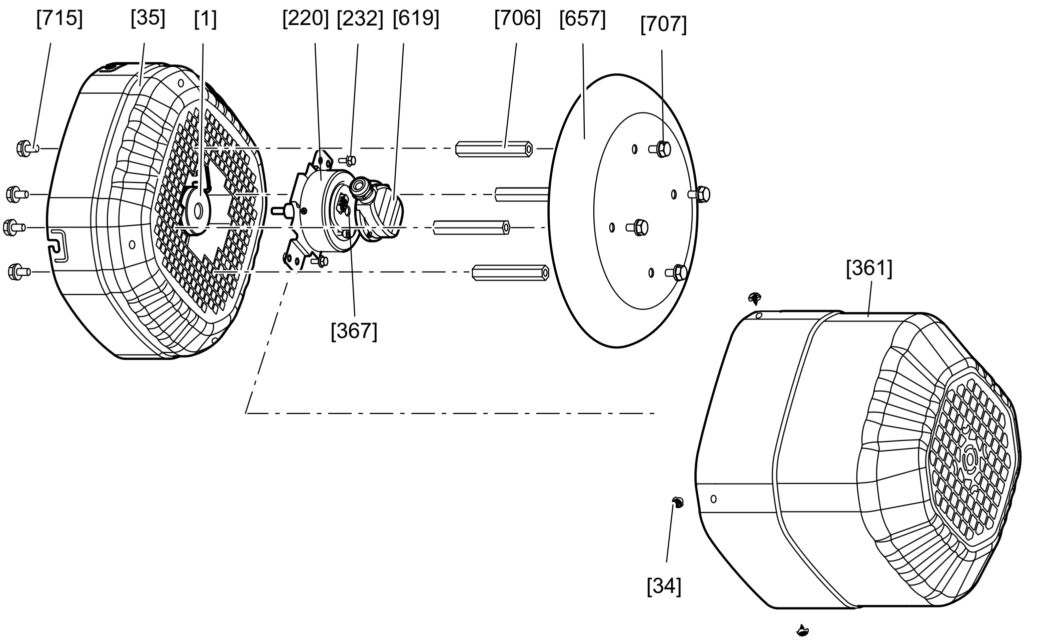
Re-assembly

Proceed as follows to re-assemble the encoder:

- Apply a contact corrosion prevention compound, e.g. NOCO® Fluid to the encoder spigot.
- Tighten the central retaining screw [B] with a tightening torque of 2.9 Nm (25.7 lb-in).
- Press the expansion anchor into the fan guard and make sure that it is fitted properly.
- Screw the retaining screws of the torque arm [A] into the expansion anchor all the way and tighten it with 1.0 Nm (8.8 lb-in).
- Install the connection cover [619].
- Install the extended fan guard [361].

  Prior to assembly, check that the gasket of the connection cover is in flawless condition. Replace damage or porous gaskets.

8.4.2 (Dis)assembling the incremental encoder of the EDR.160 – EDR.225



[1] Rotor	[220] Connection cover	[619] Encoder	[707] Screws
[34] Tapping screw	[232] Screws	[657] Cover	[715] Screws
[35] Fan guard	[367] Retaining screw	[706] Spacer bolt	

Removing EG7./ AG7.

- Perform one of the following steps depending on the housing design:
  - Loosen the screws [707] and remove the canopy [657].

    Use SW13 spacer bolts [706] to counterhold.
  - Loosen the screws [34] and remove the extended fan guard [361].
- Unscrew and remove the connection cover [619].
- Remove the screws [232]
- Remove the fan guard [35]
- Force off the encoder [619] by loosening the central retaining screw [367]

  If the encoder is hard to loosen, you can loosen or counterhold the encoder shaft at the installed SW17 spanner flat.

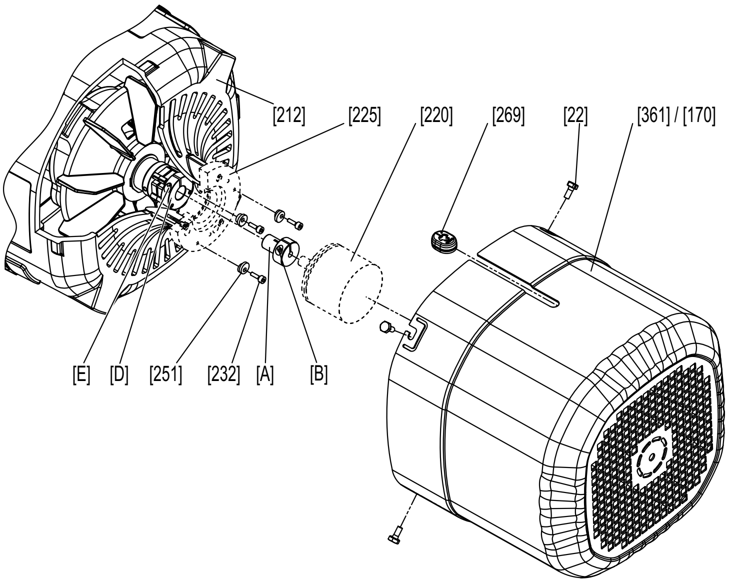
Re-assembly

- Apply a contact corrosion prevention compound, e.g. NOCO®-Fluid to the encoder shaft.
- Apply the encoder in the rotor bore and screw it in with the central retaining screw [367] all the way and tighten the screw with 6 Nm (53.1 lb-in).
- Mount fan guard [35].
- Apply a medium thread locking compound, e.g. Loctite® 243, to the 2 screws and screw the torque plate of the encoder to the fan grille with a tightening torque of 6 Nm (53.1 lb in).
- Install connection cover [619].

  Prior to assembly, check that the gasket of the connection cover is in flawless condition. Replace damage or porous gaskets.
- Install the canopy [657] with the screws [707], or install the extended fan guard [361] with the screws [34].

8.4.3 Removing/installing incremental encoders, absolute encoders and special encoders with XV.A mounting adapter from/on DR.71 – 225

The following figure illustrates the disassembly procedure using a non-SEW encoder as an example:



3568918283

[22]	Screw	[361]	Cover (normal/long)
[170]	forced cooling fan guard	[269]	Grommet
[212]	Fan guard with encoder mount	[A]	Adapter
[220]	Encoder	[B]	Clamping screw
[225]	Intermediate flange (not with XV1A)	[D]	Coupling (spread- or solid shaft coupling)
[232]	Screws (enclosed with XV1A and XV2A)	[E]	Clamping screw
[251]	Conical spring washers (enclosed with XV1A and XV2A)		

EV.., AV.. and XV. encoder removal

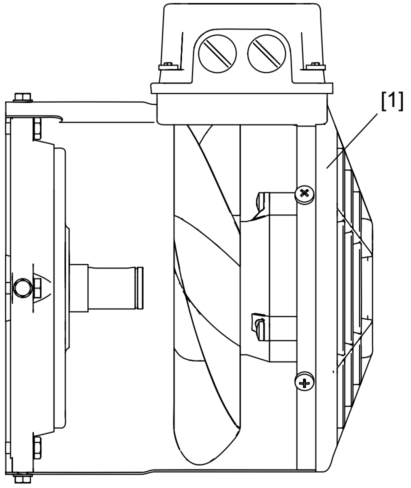
1. Remove the protection cover [361] by loosening the screws [22] or remove forced-cooling fan guard [170].
2. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
3. Loosen the clamping screw [E] of the coupling.
4. Remove the adapter [A] and the encoder [220].

Re-assembly

1. Proceed according to chapter "Installing XV.A encoder mounting adapter on EDR.71 – 225 motors (page 28)" to mount the encoder.

8.4.4 Mounting a VE forced cooling fan

The following figure shows a VE forced cooling fan:



[1] Forced cooling fan

1. Before installing the forced cooling fan [1], check the fan wheel and the fan motor for damage.
2. After installation, turn the fan wheel to make sure that the fan wheel does not rub in any place. The clearance between the fan wheel and fixed parts must be at least 1 mm.

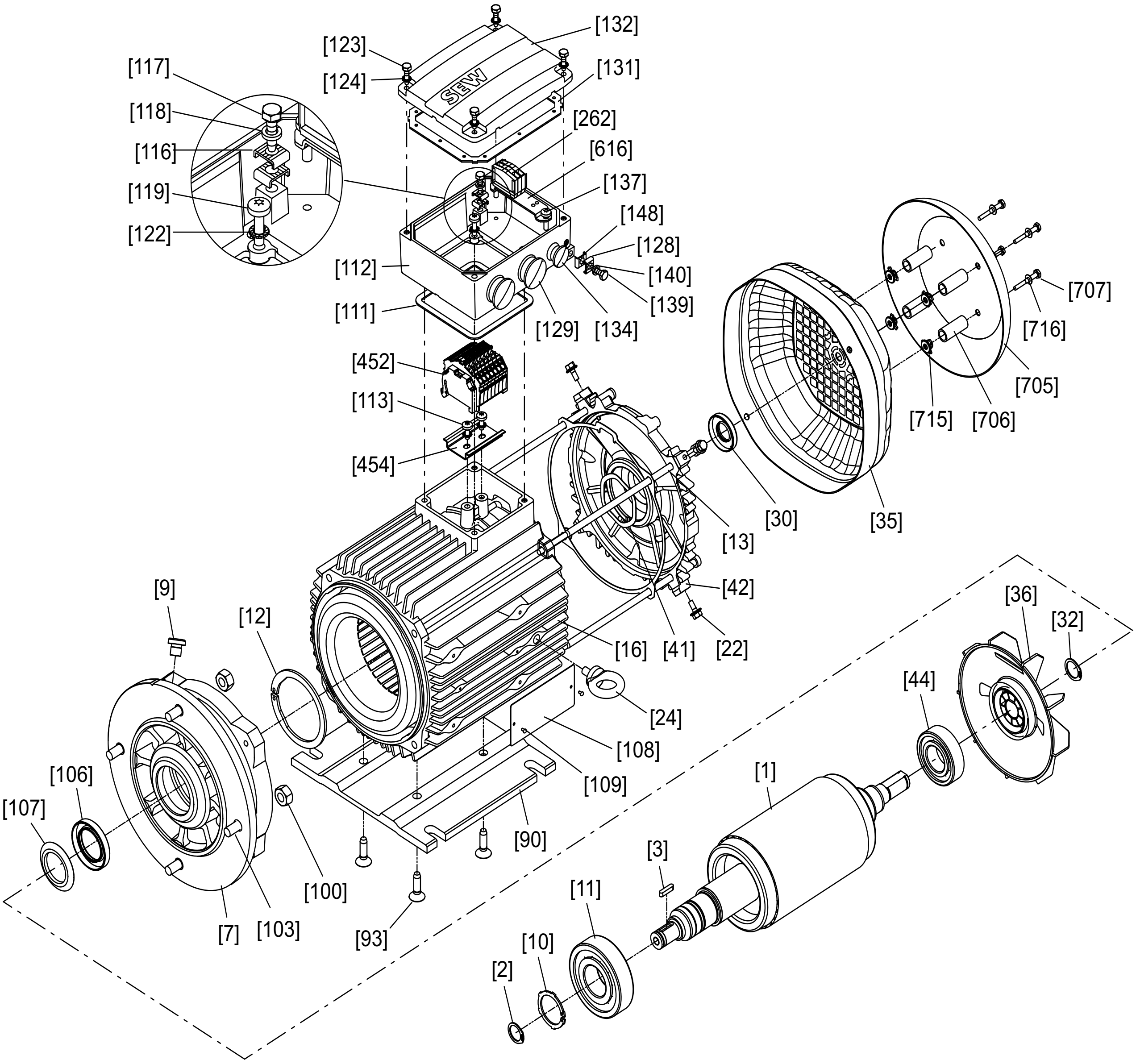
INFORMATION

Observe the operating instructions of the forced cooling fan (page 162).

8.5 *Inspection/maintenance for EDR.71 – EDR.225 motors*

8.5.1 General structure of EDR.71 – EDR.132

The following figure shows an example of the basic structure of EDR.71 – EDR.132 with spring terminal strip:


[132]
[123]
[117]
[124]
[131]
[118]
[262]
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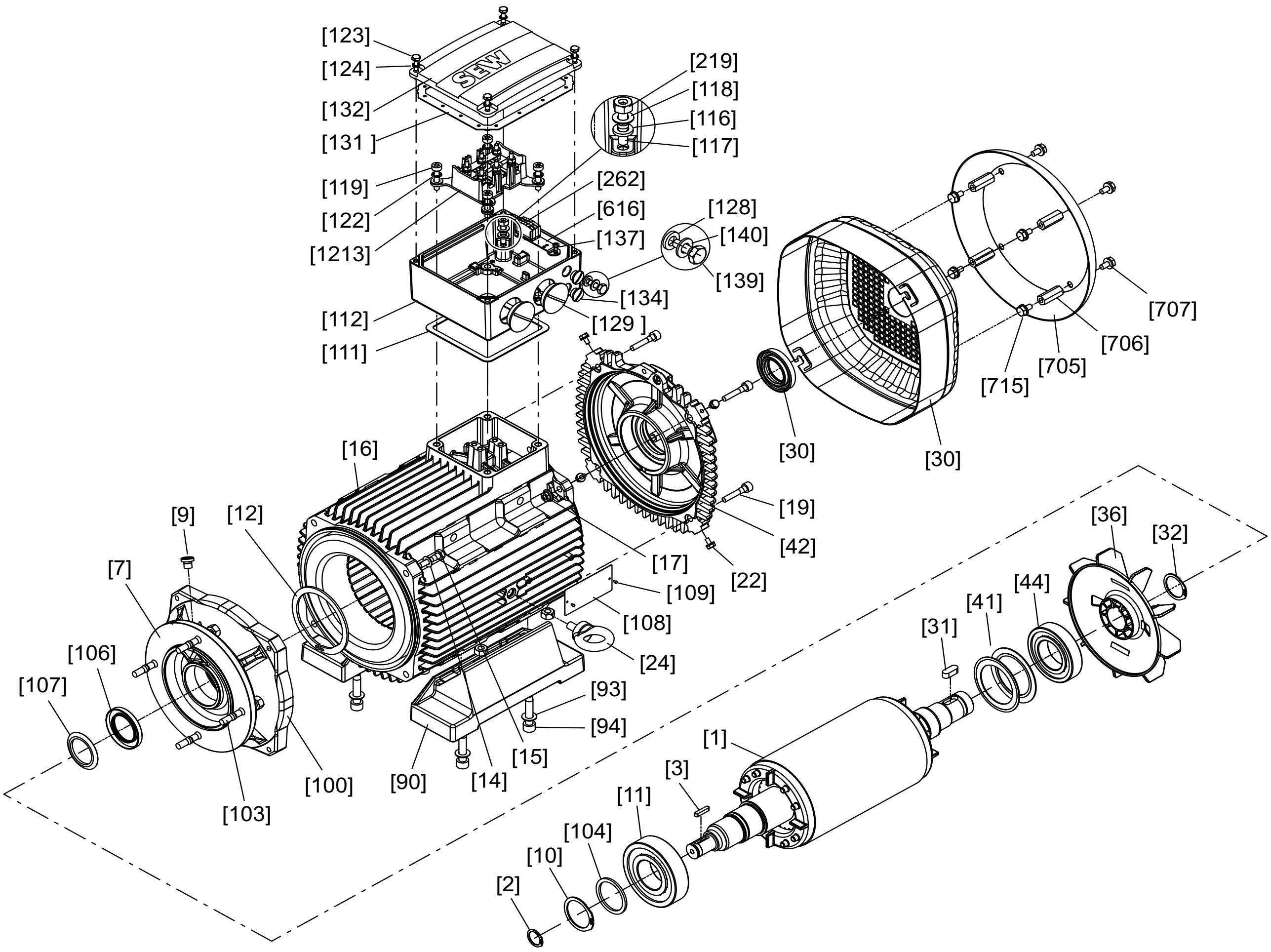
[616]
[137]
[119]
[148]
[122]
[128]
[112]
[140]
[707]
[111]
[139]
[129]
[134]
[716]
[452]
[705]
[113]
[715]
[706]
[454]
[30]
[35]
[13]
[9]
[42]
[36]
[12]
[32]
[16]
[41]
[22]
[44]
[24]
[108]
[106]
[1]
[109]
[107]
[90]
[3]
[100]
[11]
[7]
[103]
[93]
[10]
[2]

2931885963

[1]	Rotor
[2]	Retaining ring
[3]	Key
[7]	Flanged endshield
[9]	Screw plug
[10]	Retaining ring
[11]	Grooved ball bearing
[12]	Retaining ring
[13]	Machine screw
[16]	Stator
[22]	Hex head screw
[24]	Eyebolt
[30]	Oil seal
[32]	Retaining ring
[35]	Fan guard
[36]	Fan
[41]	Shim
[42]	B-side endshield
[44]	Grooved ball bearing
[90]	Base plate
[93]	Countersunk screw
[100]	Hex nut
[103]	Stud
[106]	Oil seal
[107]	Oil flinger
[108]	Nameplate
[109]	Grooved pin
[111]	Gasket for lower part
[112]	Terminal box lower part
[113]	Pan head screw
[116]	Terminal clip
[117]	Hex head screw
[118]	Lock washer
[119]	Pan head screw
[122]	Lock washer
[123]	Hex head screw
[124]	Lock washer
[128]	Terminal clip
[129]	Screw plug
[131]	Gasket for cover
[132]	Terminal box cover
[134]	Screw plug
[137]	Screw
[139]	Hex head screw
[140]	Lock washer
[148]	Terminal clip
[262]	Terminal
[392]	Seal
[452]	Terminal strip
[454]	Support rail
[616]	Retaining plate
[705]	Canopy
[706]	Spacers
[707]	Pan head screw
[715]	Blind rivet
[716]	Washer

8.5.2 General structure EDR.160 – EDR.180

The following figure shows an example of the basic structure of EDR.160 – EDR.180 with anti-twist frame:


[123]
[124]
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SEW
[219]
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[117]
[119]
[122]
[1213]
[262]
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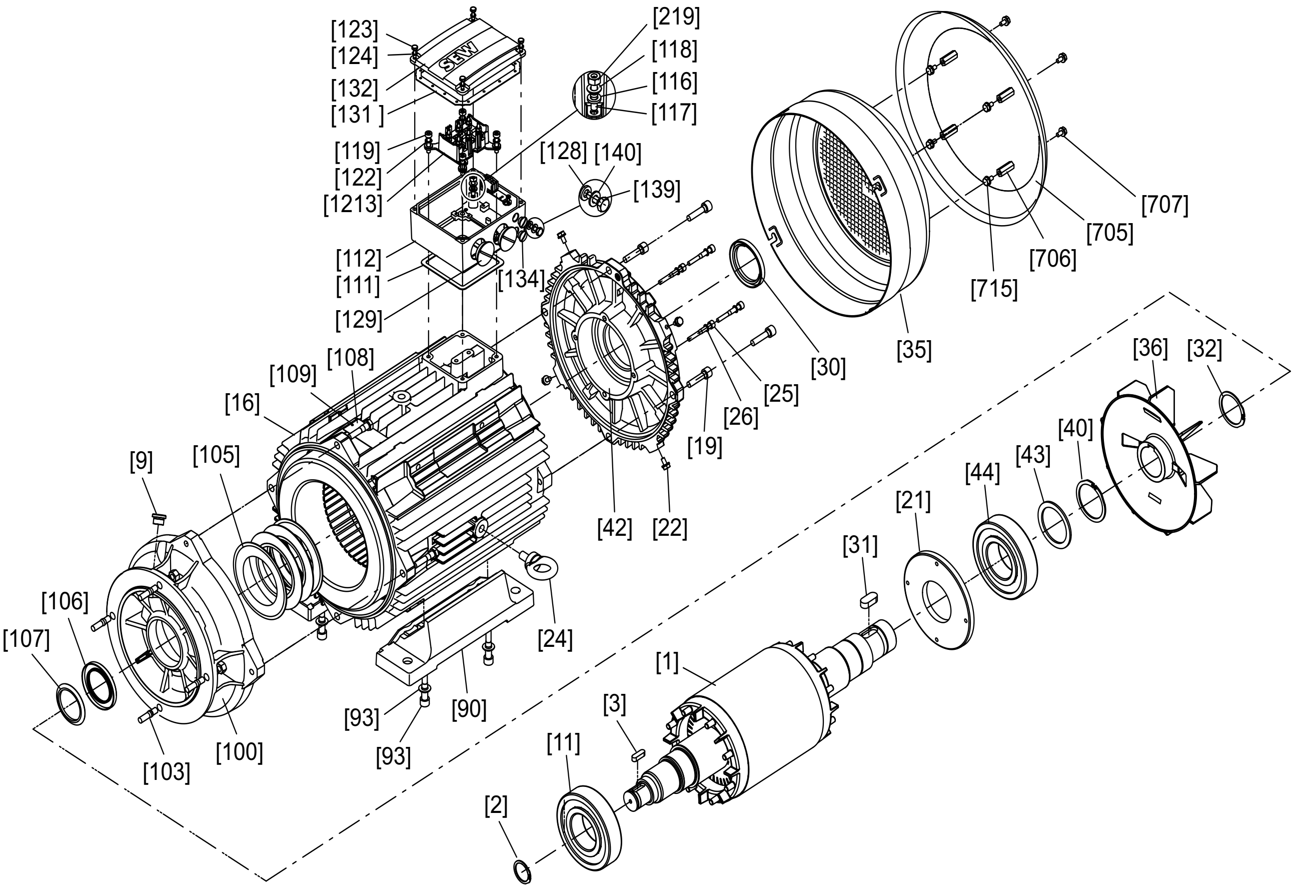
[128]
[140]
[139]
[134]
[129]
[112]
[111]
[707]
[706]
[705]
[715]
[30]
[30]
[16]
[19]
[42]
[22]
[17]
[109]
[108]
[9]
[12]
[7]
[106]
[107]
[24]
[93]
[94]
[15]
[14]
[90]
[100]
[103]
[36]
[32]
[44]
[41]
[31]
[1]
[3]
[11]
[104]
[10]
[2]

2967197579

[1]	Rotor
[2]	Retaining ring
[3]	Key
[7]	Flange
[9]	Screw plug
[10]	Retaining ring
[11]	Grooved ball bearing
[12]	Retaining ring
[14]	Washer
[15]	Hex head screw
[16]	Stator
[17]	Hex nut
[19]	Machine screw
[22]	Hex head screw
[24]	Eyebolt
[30]	Sealing ring
[31]	Key
[32]	Retaining ring
[35]	Fan guard
[36]	Fan
[41]	Spring washer
[42]	B-side endshield
[44]	Grooved ball bearing
[90]	Foot
[91]	Hex nut
[93]	Washer
[94]	Machine screw
[100]	Hex nut
[103]	Stud
[104]	Supporting ring
[106]	Oil seal
[107]	Oil flinger
[108]	Nameplate
[109]	Grooved pin
[111]	Gasket for lower part
[112]	Terminal box lower part
[116]	Serrated lock washer
[117]	Stud
[118]	Washer
[119]	Machine screw
[122]	Lock washer
[123]	Hex head screw
[124]	Lock washer
[128]	Serrated lock washer
[129]	Screw plug
[131]	Gasket for cover
[132]	Terminal box cover
[134]	Screw plug
[139]	Hex head screw
[140]	Washer
[219]	Hex nut
[705]	Canopy
[706]	Spacers
[707]	Hex head screw
[715]	Hex head screw
[1213]	Kit (1 anti-twist frame, 1 terminal board, 4 sleeves, 2 screws, 2 nuts)

8.5.3 General structure EDR.200 – EDR.225

The following figure shows an example of the basic structure of EDR.200 – EDR.225 with anti-twist frame:


[123]
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[111]
[129]
[219]
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[116]
[117]
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[42]
[22]
[19]
[26]
[25]
[30]
[35]
[715]
[706]
[705]
[707]
[36] [32]
[40]
[43]
[44]
[21]
[31]
[1]
[3]
[11]
[2]
SEW

3055268107

[1]	Rotor
[2]	Retaining ring
[3]	Key
[7]	Flange
[9]	Screw plug
[11]	Grooved ball bearing
[16]	Stator
[19]	Machine screw
[21]	Oil seal flange
[22]	Hex head screw
[24]	Eyebolt
[25]	Machine screw
[26]	Sealing washer
[31]	Key
[32]	Retaining ring
[35]	Fan guard
[36]	Fan
[40]	Retaining ring
[42]	B-side endshield
[43]	Supporting ring
[44]	Grooved ball bearing
[90]	Foot
[93]	Washer
[94]	Machine screw
[100]	Hex nut
[103]	Stud
[105]	Spring washer
[106]	Oil seal
[107]	Oil flinger
[108]	Nameplate
[109]	Grooved pin
[111]	Gasket for lower part
[112]	Terminal box lower part
[107]	Oil flinger
[116]	Serrated lock washer
[117]	Stud
[118]	Washer
[119]	Machine screw
[123]	Hex head screw
[124]	Lock washer
[128]	Serrated lock washer
[129]	Screw plug
[131]	Gasket for cover
[132]	Terminal box cover
[134]	Screw plug
[139]	Hex head screw
[140]	Washer
[219]	Hex nut
[705]	Canopy
[706]	Spacer bolt
[707]	Hex head screw
[715]	Hex head screw
[1213]	Kit (1 anti-twist frame, 1 terminal board, 4 sleeves, 2 screws, 2 nuts)

8.5.4 Inspection procedure for EDR.71 – EDR.225 motors

WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove forced cooling fan and incremental encoder (if installed).

   See chapter "Inspection/Maintenance" > "Motor maintenance – preliminary work".
2. Remove fan guard [35] and fan [36].
3. Remove stator:
   - **Sizes EDR.71 – EDR.132:** Remove machine screws [13] from flanged endshield [7] and B-side endshield [42]. Remove stator [16] from flanged endshield [7].
   - **Sizes EDR.160 – EDR.180:** Loosen hex head screw [19] and remove B-side endshield [42]. Loosen hex head screw [15] and remove stator from flanged endshield.
   - **Sizes EDR.200 – EDR.225:**
     - Loosen hex head screw [15] and remove the flanged endshield [7] from the stator.
     - With gearmotors: Remove oil flinger [107]
     - Loosen hex head screw [19] and remove the complete rotor [1] together with the B-side endshield [42].
     - Loosen hex head screw [25] and remove the complete rotor [1] from the B-side endshield [42].
4. Visual inspection: Is there any moisture or gear unit oil inside the stator?
   - If not, proceed with step 7.
   - If there is moisture, proceed with step 5
   - If there is gear oil, have the motor repaired by a specialist workshop
5. If there is moisture inside the stator:
   - With gearmotors: Remove the motor from the gear unit
   - With motors without a gear unit: Remove the A-flange
   - Remove the rotor [1]
6. Clean the winding, dry it and check it electrically, see chapter "Mechanical Installation" > "Long-term storage of motors" > "Drying the motor".

7. Replace the grooved ball bearings [11] [44] with permitted ball bearings.

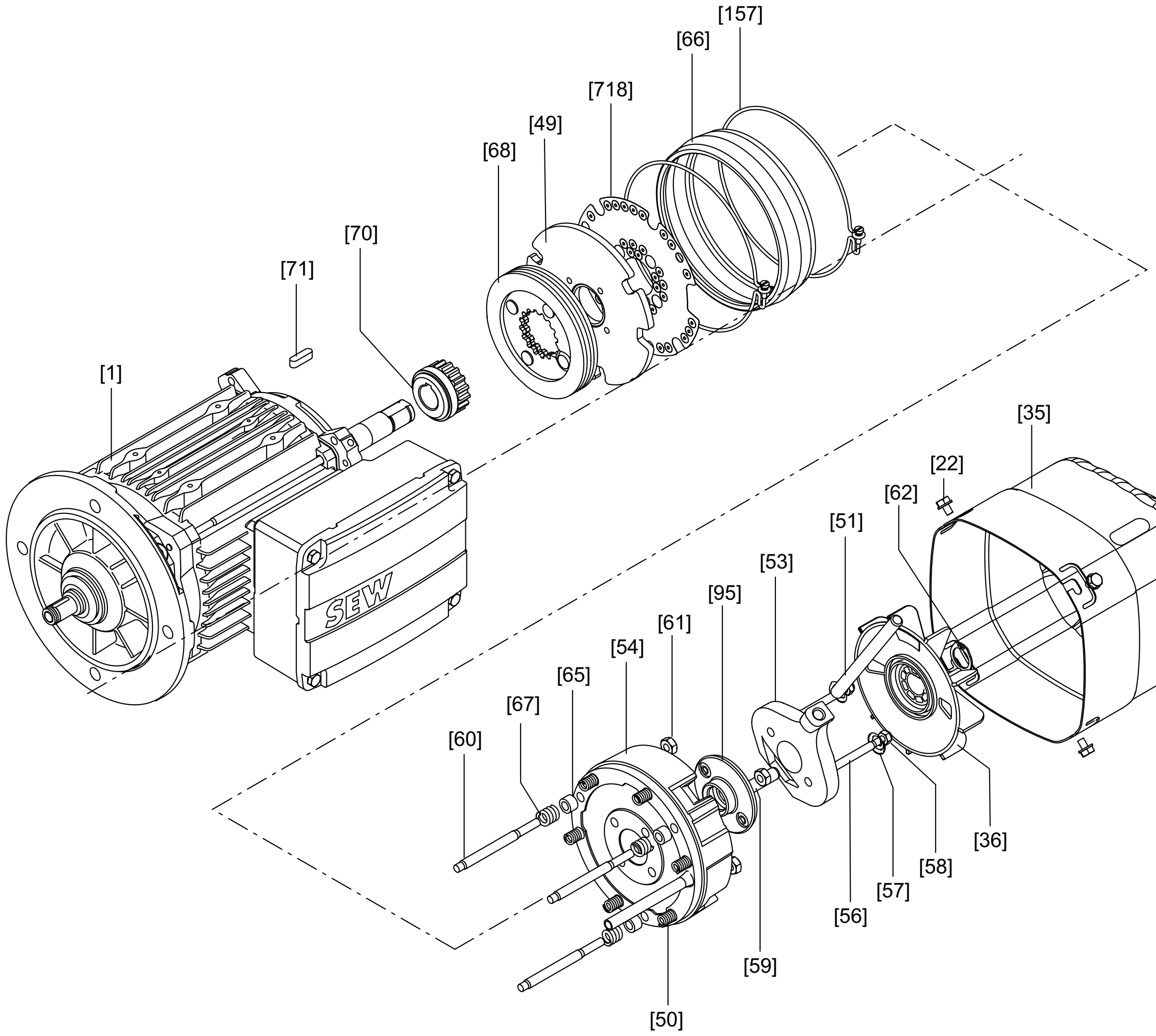
   See chapter “Technical Data” > "Permitted rolling bearing types".
8. Reseal the shaft:
   - A-side: Replace the oil seal [106]
   - B-side: Replace the oil seal [95]

     Apply grease to the sealing lip (see chapter "Order information for lubricants and anti-corrosion agents" (page 146)).
9. Reseal the stator seat:
   - Seal the sealing surface with duroplastic sealing compound

     (operating temperature -40 °C to +180 °C) e.g. "SEW L Spezial" (page 146).
   - Sizes EDR.71 – EDR.132: Replace sealing [392].
10. Install the motor and accessory equipment.

8.6 Inspection/maintenance for EDR.71 – EDR.225 brakemotors

8.6.1 Basic structure of EDR.71 – EDR.80 brakemotors



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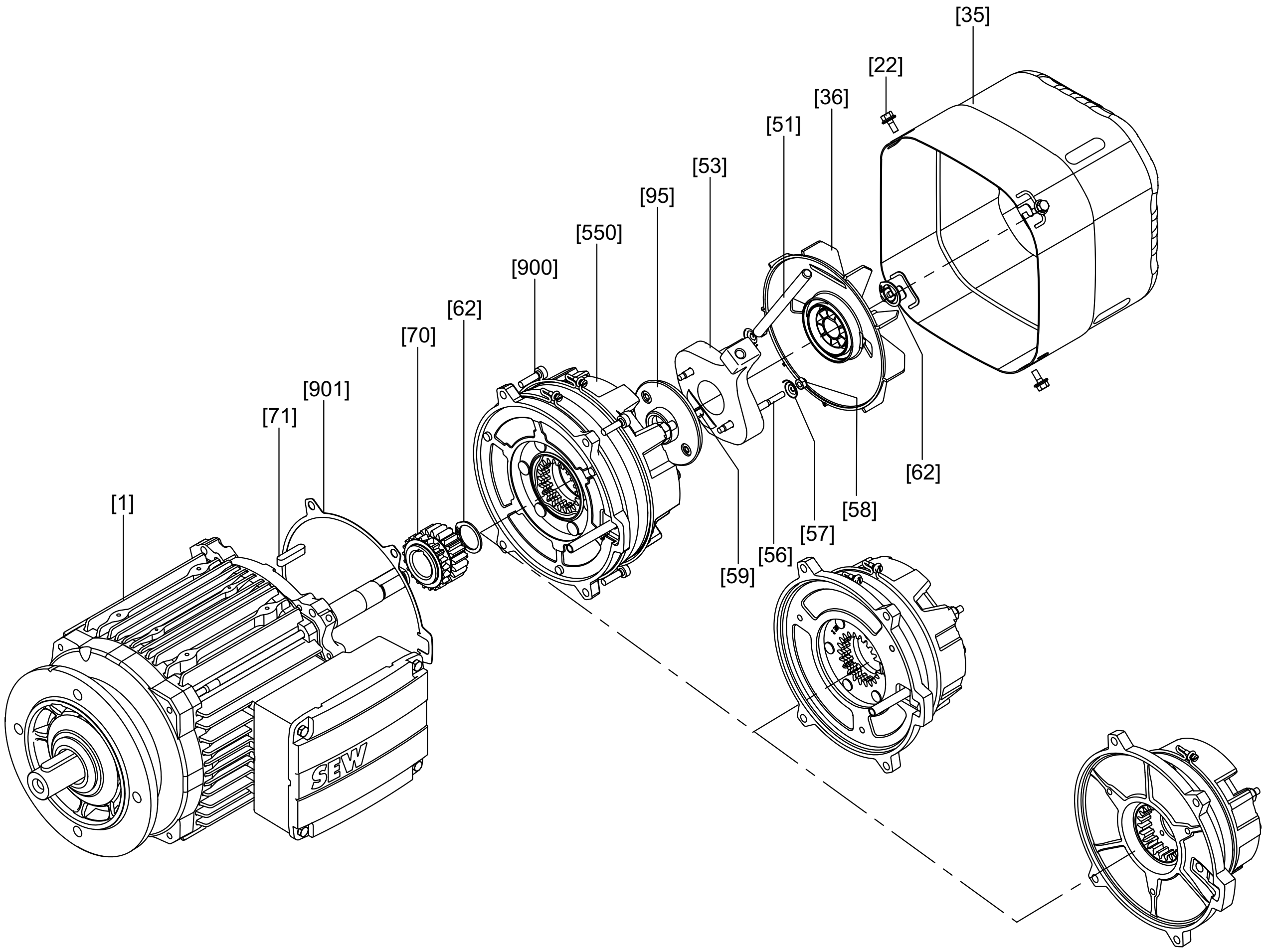
[1]	Motor with brake endshield
[22]	Hex head screw
[35]	Fan guard
[36]	Fan
[49]	Pressure plate
[50]	Brake spring
[51]	Hand lever
[53]	Release lever
[54]	Magnet, complete
[56]	Stud
[57]	Conical spring
[58]	Setting nut
[59]	Parallel pin
[60]	Stud 3x
[61]	Hex nut
[62]	Retaining ring
[65]	Pressure ring
[66]	Rubber sealing collar
[67]	Counter spring
[68]	Brake disk
[70]	Driver
[71]	Key
[95]	Sealing ring
[157]	Clamping straps 2x
[718]	Damping plate

8.6.2 Basic structure of EDR.90 – EDR.132 brakemotors



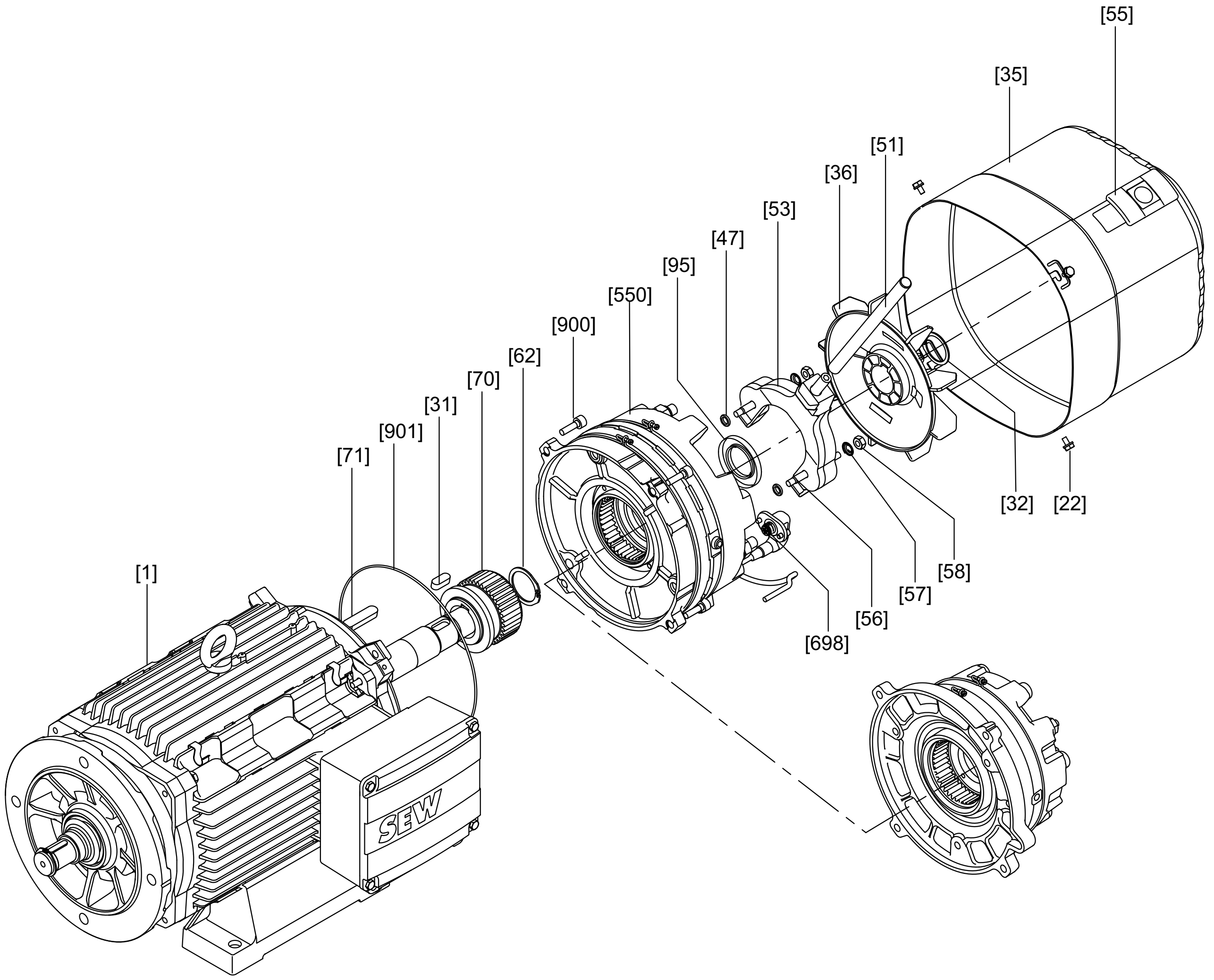
9007199434722955

[1] Motor with brake endshield
[22] Hex head screw
[32] Retaining ring
[35] Fan guard
[36] Fan
[51] Hand lever

[53] Release lever
[56] Stud
[57] Conical coil spring
[58] Setting nut
[59] Parallel pin
[62] Retaining ring

[70] Carrier
[71] Key
[95] Sealing ring
[550] Pre-assembled brake
[900] Screw
[901] Sealing

8.6.3 Basic structure of EDR.160 – EDR.225 brakemotors



9007199781964683

[1] Motor with brake endshield
[22] Hex head screw
[31] Key
[32] Retaining ring
[35] Fan guard
[36] Fan
[47] O-ring
[51] Hand lever
[53] Release lever
[55] Closing piece
[56] Stud
[57] Conical coil spring
[58] Setting nut
[62] Retaining ring
[70] Carrier
[71] Key
[95] Sealing ring
[550] Pre-assembled brake
[698] Plug connector complete (only for BE20 – BE32)
[900] Screw
[901] O-ring

8.6.4 Inspection procedure for EDR.71 – EDR.225 brakemotors

WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove forced cooling fan and incremental encoder (if installed).

   See section "Motor and brake maintenance – preliminary work" (page 96).
2. Remove fan guard [35] and fan [36].
3. Remove stator:
   - **Sizes EDR.71 – EDR.132:** Remove machine screws [13] from flanged endshield [7] and brake endshield [42]. Remove stator [16] from flanged endshield [7].
   - **Sizes EDR.160 – EDR.180:** Loosen hex head screw [19] and remove brake endshield [42]. Loosen hex head screw [15] and remove stator from flanged endshield.
   - **Sizes EDR.200 – EDR.225:**
     - Loosen hex head screw [15] and remove the flanged endshield [7] from the stator.
     - With gearmotors: Remove oil flinger [107]
     - Loosen hex head screw [19] and remove the complete rotor [1] together with the brake endshield [42].
     - Loosen hex head screw [25] and remove the complete rotor [1] from the brake endshield [42].
4. Remove the brake cable:
   - **BE05 – BE11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – BE32:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
5. Push the brake off the stator and carefully lift it off.
6. Pull the stator back by about 3 to 4 cm.
7. Visual inspection: Is there any moisture or gear unit oil inside the stator?
   - If not, proceed with step 10.
   - If there is moisture, proceed with step 8
   - If there is gear oil, have the motor repaired by a specialist workshop
8. If there is moisture inside the stator:
   - With gearmotors: Remove the motor from the gear unit
   - With motors without a gear unit: Remove the A-flange
   - Remove the rotor [1]
9. Clean the winding, dry it and check it electrically (see chapter "Drying the motor" (page 23)).

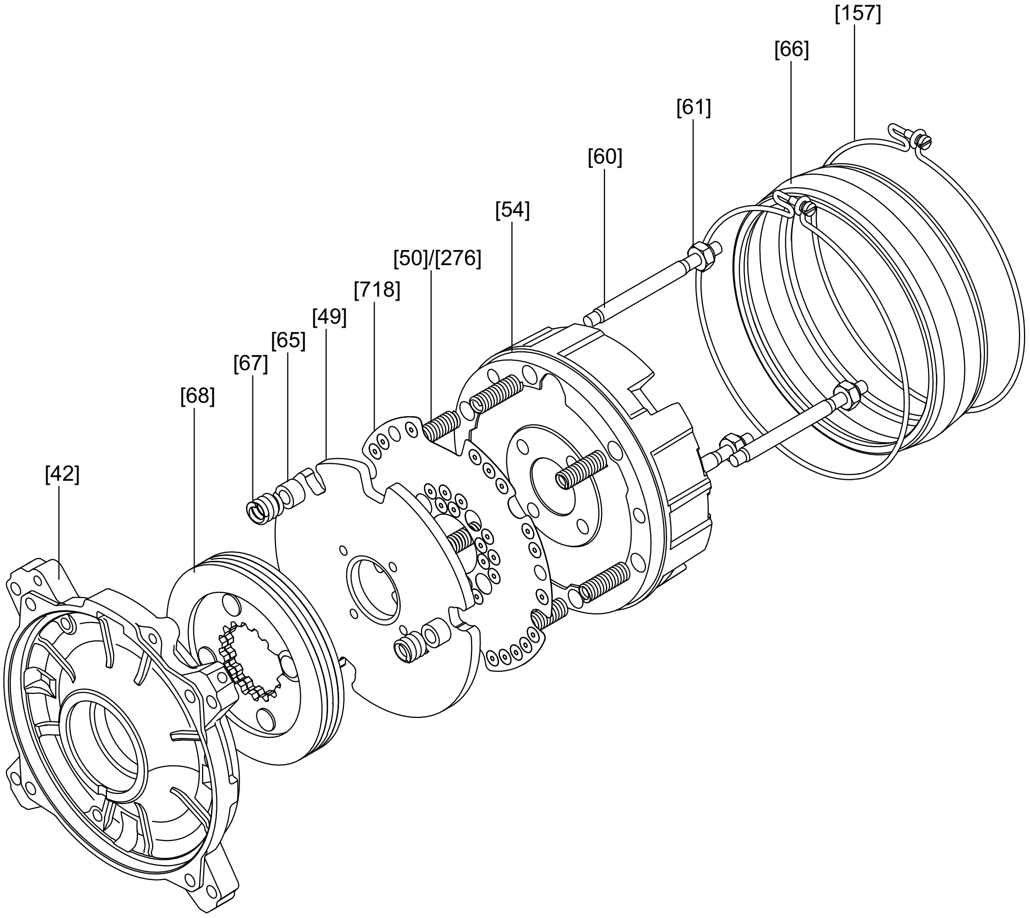
10. Replace the grooved ball bearings [11] [44] with permitted ball bearings.

    See section"Permitted rolling bearing types" (page 145).
11. Reseal the shaft:
    - A-side: Replace the oil seal [106]
    - B-side: Replace the oil seal [95]

      Apply grease to the sealing lip (see chapter "Order information for lubricants and anti-corrosion agents" (page 146)).
12. Reseal the stator seat:
    - Seal the sealing surface with duroplastic sealing compound

      (Operating temperature – 40 °C to +180 °C) e.g. "SEW L Spezial".
    - Sizes EDR.71 – EDR.132: Replace sealing [392].
13. **Motor sizes EDR.160 – EDR.225:** Replace the O-ring [901] between the brake endshield [42] and the pre-assembled brake [550]. Install the pre-assembled brake [550]
14. Install the motor, the brake and accessory equipment.

8.6.5 Basic structure of BE05 – BE2 brakes (EDR.71 – EDR.80)



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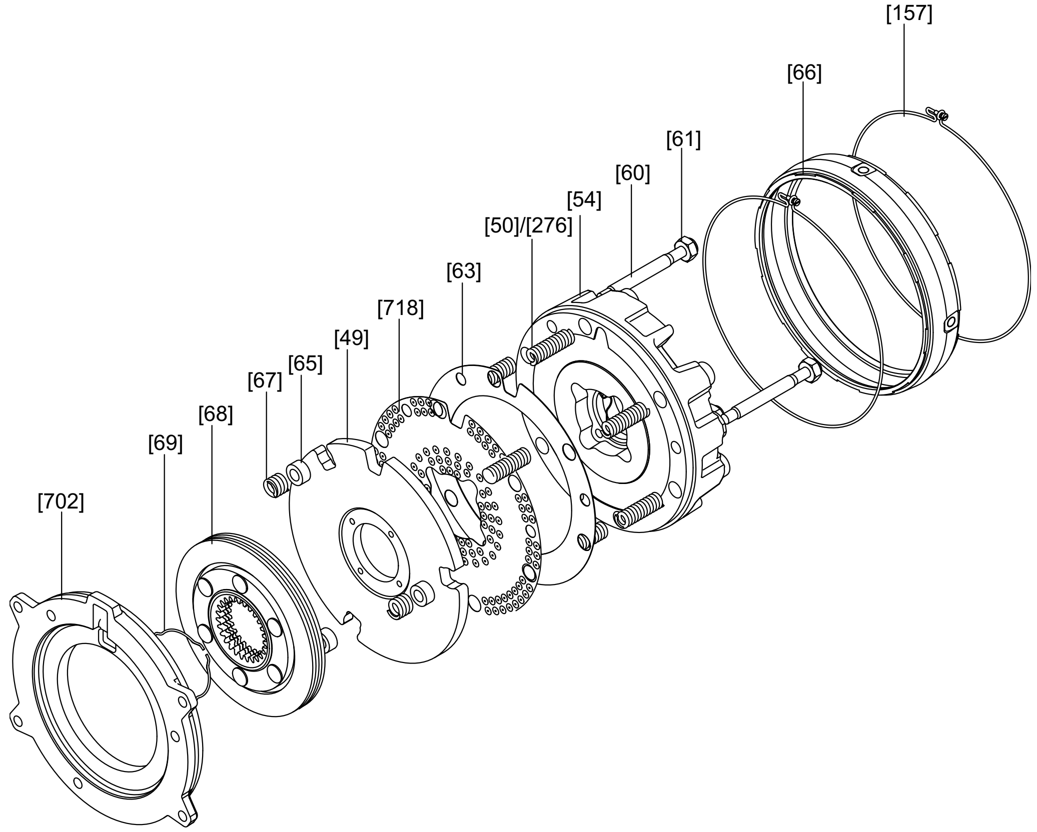
[42]	Brake endshield	[61]	Hex nut	[68]	Brake disk
[49]	Pressure plate	[65]	Pressure ring	[157]	Clamping straps 2x
[50]	Brake spring (normal)	[66]	Rubber sealing collar	[276]	Brake spring (blue)
[54]	Magnets, complete	[67]	Counter spring	[718]	Damping plate
[60]	Stud 3x				

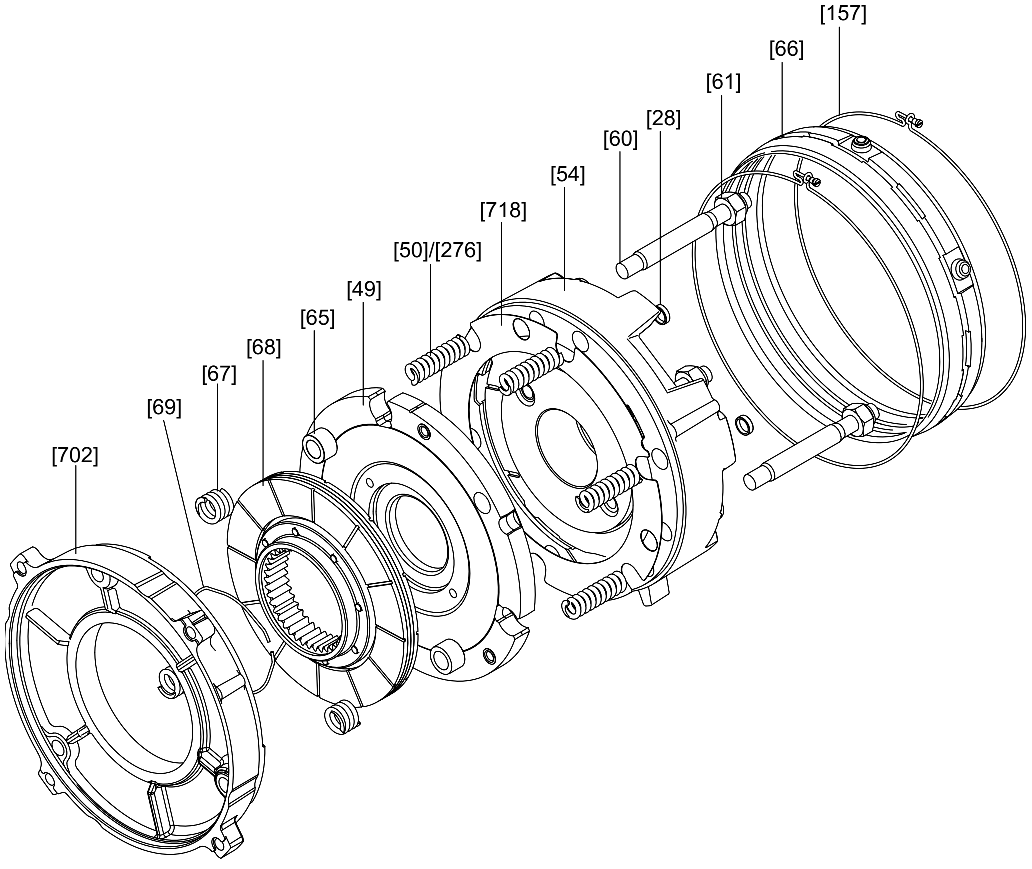
8.6.6 Basic structure of BE1 – BE11 brakes (EDR.90 – EDR.160)



3850423563

[49]	Pressure plate	[63]	Pole sheet	[69]	Circular spring
[50]	Brake spring (normal)	[65]	Pressure ring	[157]	Clamping straps 2x
[54]	Magnets, complete	[66]	Rubber sealing collar	[276]	Brake spring (blue)
[60]	Stud 3x	[67]	Counter spring	[702]	Friction disk
[61]	Hex nut	[68]	Brake disk	[718]	Damping plate

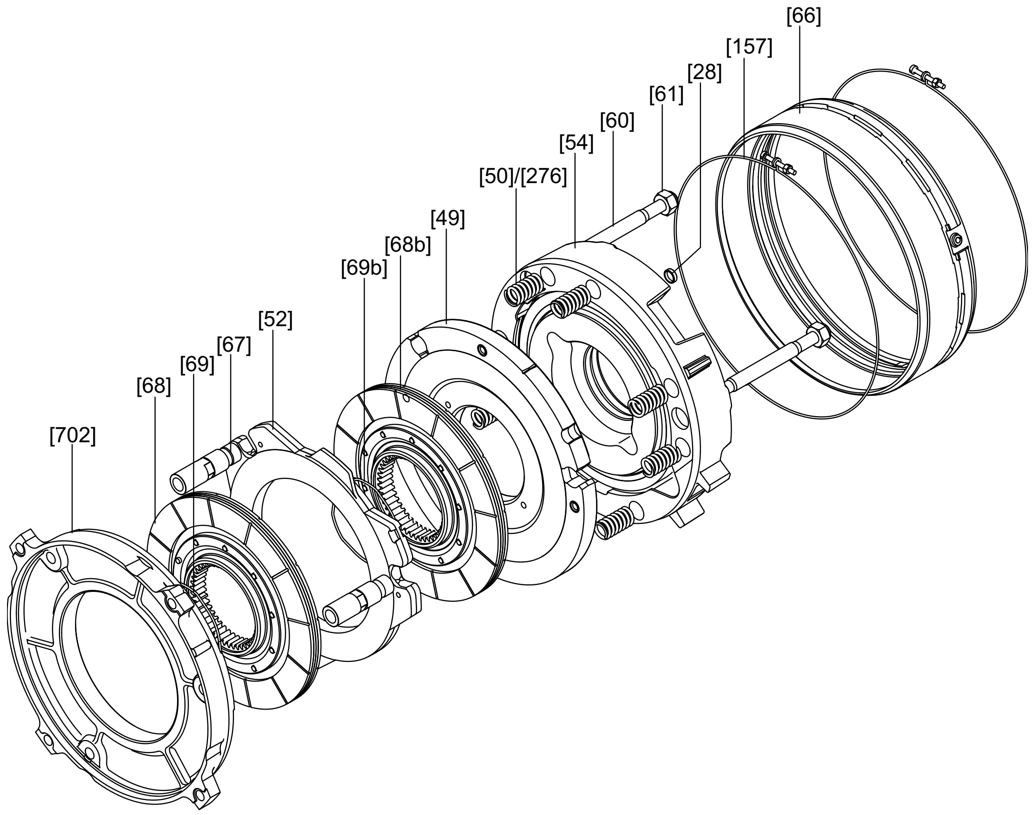
8.6.7 Basic structure of BE20 brakes (EDR.160 – EDR.180)



3850427403

[28]	Closing cap
[49]	Pressure plate, complete
[50]	Brake spring (normal)
[54]	Magnets, complete
[60]	Stud 3x
[61]	Hex nut
[65]	Pressure ring
[66]	Rubber sealing collar
[67]	Counter spring
[68]	Brake disk
[69]	Circular spring
[157]	Clamping straps 2x
[276]	Brake spring (blue)
[702]	Friction disk
[718]	Damping plate

8.6.8 Basic structure of BE30 – BE32 brakes (EDR.180 – EDR.225)



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[28]	Closing cap	[60]	Stud 3x	[69]	Circular spring
[49]	Pressure plate, complete	[61]	Hex nut	[157]	Clamping straps 2x
[50]	Brake spring (normal)	[66]	Rubber sealing collar	[276]	Brake spring (blue)
[52]	Brake stationary disk	[67]	Adjusting sleeve	[702]	Friction disk
[54]	Magnets, complete	[68]	Brake disk		

8.6.9 Setting the working air gap of BE05 – BE32 brakes

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

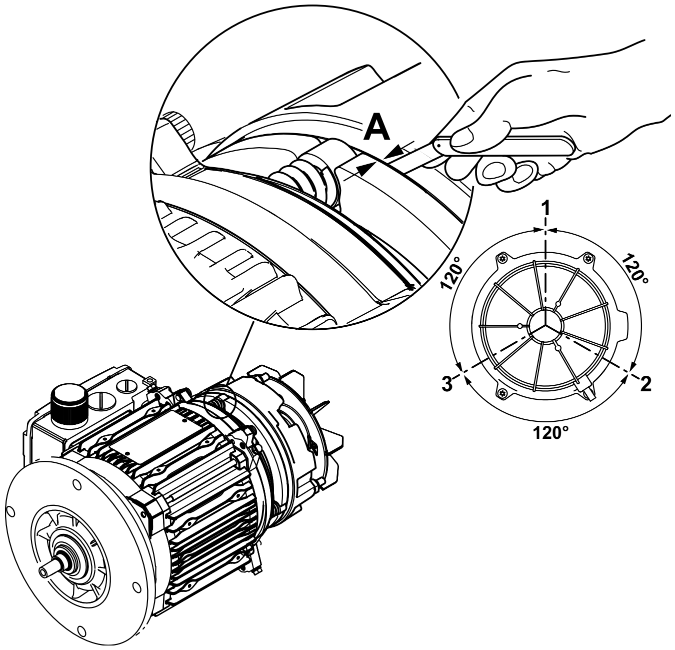
Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove the following:
   - Forced cooling fan and incremental encoder (if installed)

     See section "Motor and brake maintenance – preliminary work" (page 96).
   - Flange cover or fan guard [35]
2. Push the rubber sealing collar [66] aside,
   - **For BE05 and BE1:** Remove the tie rods of the motor
   - Loosen the clamping straps [157]
   - Sucking off any abrasion
3. Measure the brake disk [68]:
   - Minimum brake disk thickness see chapter "Technical Data" (page 126).
   - Replace brake disk if necessary, see chapter "Replacing the brake disk of BE05 – BE32 brakes".
4. **BE30 – BE32:** Unfasten the setting sleeves [67] by turning it towards the brake endshield.
5. Measure the working air gap A (see the following figure)

   (use a feeler gauge and measure at three points offset by 120°):
   - **for BE05 – 11:** between the pressure plate [49] and damping plate [718]
   - **for BE20 – 32:** between the pressure plate [49] and brake coil body [54]



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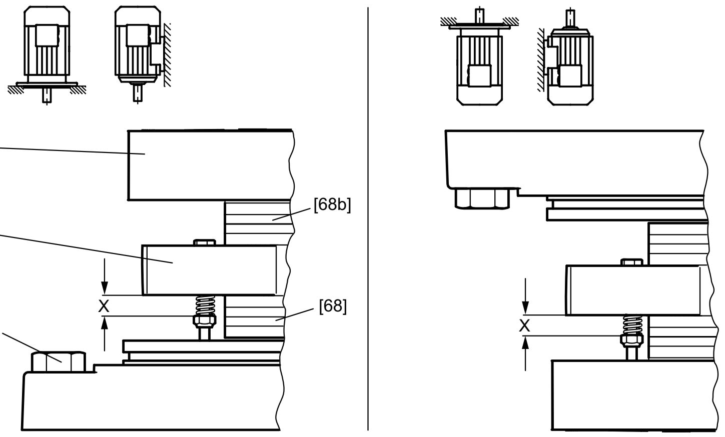
6. **BE05 – BE20:** Tighten the hex nuts [61] until the working air gap is set correctly, see chapter "Technical Data" (page 126)

   BE30 – BE32: Tighten the hex nuts [61] until the working air gap is 25 mm.
7. If you are mounting the BE32 in a vertical position, set the 3 springs on the brake stationary disk to the following measurement:

Mounting position	X in [mm]
Brake at the top	7.3
Brake at the bottom	6.5



[49]	Pressure plate
[52b]	Brake lining (BE32 only)
[68]	Brake disk
[68b]	Brake disk (BE32 only)
[900]	Hex nut

8. **BE30 – BE32:** Tighten the setting sleeves [67]
   - towards the magnet
   - until the working air gap is set correctly, see chapter "Technical Data" (page 126).
9. Seal hex nuts [61] with duroplastic sealing compound, e.g. "SEW L Spezial".
10. Mount sealing strip [66], clamping strap [157], and tie rods if applicable, re-install the removed parts.

8.6.10 Replacing the brake disk of BE05 – BE32 brakes

In addition to the brake elements listed in column "BE brake", see chapter "Inspection and maintenance intervals", check the hex nut nuts [61] for wear when you replace the brake disk. You must always replace the hex nuts [61] when you replace the brake disk.

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

INFORMATION

- The brake of EDR.71 – EDR.80 motor sizes cannot be removed from the motor because the BE brake is directly installed on the brake endshield of the motor.
- The brake of EDR.90 – EDR.225 motor sizes can be removed from the motor for replacing the brake disk because the BE brake is pre-installed on the brake endshield of the motor via a friction disk .

1. Remove the following:
   - Forced cooling fan and incremental encoder (if installed)

     See section "Motor and brake maintenance – preliminary work" (page 96).
   - Flange cover or fan guard [35], circlip [32/62] and fan [36]
2. Remove the brake cable
   - **BE05 – BE11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE11 – BE32:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
3. **For BE05 and BE1:** Remove the tie rods of the motor
   - Remove the sealing strip [66] and clamping strap [157]
4. Loosen hex nuts [61], carefully pull off the magnet [54] (brake cable!) and take out the brake springs [50].
5. **BE05 – BE11:** Remove the damping plate [718], pressure plate [49] and brake disk [68]

   BE20 – BE30: Remove pressure plate [49] and brake disk [68]

   BE32: Remove pressure plate [49], brake disk [68] and [68b]
6. Clean the brake parts, check for damage, and replace if necessary.
7. Install a new brake disk(s).
8. Re-install the brake components,
   - Leave out the fan and the fan guard, because the working air gap has to be set first, see chapter "Setting the working air gap of the BE05 – BE32 brakes".

9. Reseal the shaft:
   - Replace the sealing ring [95]

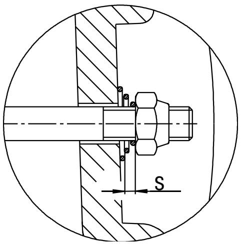
     Apply grease to the sealing lip (see chapter "Order information for lubricants and anti-corrosion agents" (page 146)).
10. With manual brake release: Use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

⚠ WARNING

No braking due to incorrectly set floating clearance "s".

Severe or fatal injuries.

- Set the floating clearance "s" correctly according to the following figure and table so that the pressure plate can move up as the brake lining wears.



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Brake	Floating clearance s [mm]
BE05; BE1; BE2	1.5
BE5; BE11, BE20; BE30; BE32	2

11. Seal hex nuts [61] with duroplastic sealing compound, e.g. "SEW L Spezial" (page 146).
12. Mount sealing strip [66], clamping strap [157], and tie rods if applicable, re-install the removed parts.

INFORMATION

- The lockable manual brake release (type HF) is already released when resistance is encountered when operating the grub screw.
- The self-reengaging manual brake release (type HR) can be operated with normal hand pressure.
- In brake motors with self-reengaging manual brake release, the manual brake release lever must be removed after startup/maintenance! A bracket is provided for storing the lever on the outside of the motor.

INFORMATION

Important: After replacing the brake disk, the maximum braking torque is reached only after several cycles.

8.6.11 Changing the braking torque of BE05-BE32 brakes

The braking torque can be altered in stages.

- by changing the type and number of brake springs
- by changing the complete magnet (only possible for BE05 and BE1)
- by changing the brake (from motor size DR.90).
- by changing to a two-disk brake (BE30 only)

For possible braking torque steps, refer to chapter "Technical Data" (page 126).

8.6.12 Changing the brake spring of BE05 – BE32 brakes

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove the following:
   - Forced cooling fan and incremental encoder (if installed)

     See chapter "Motor and brake maintenance – preliminary work" (page 96).
   - Flange cover or fan guard [35], circlip [32/62] and fan [36]
2. Remove the brake cable
   - **BE05 – BE11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – BE32:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
3. **For BE05 and BE1:** Remove the tie rods of the motor

   Remove the sealing strip [66] and clamping straps [157]; remove manual brake release if necessary:
   - setting nuts [58], conical coil springs [57], studs [56], releasing lever [53], spiral dowel pin [59]
4. Unfasten hex nuts [61] and pull off the magnet [54]
   - by approx. 50 mm (watch the brake cable)
5. Change or add brake springs [50/276]
   - Position the brake springs symmetrically, see chapter "Work done, working air gap, braking torques". (page 135)
6. Re-install the brake components
   - Leave out the fan and the fan guard, because the working air gap has to be set first, see chapter "Setting the working air gap of the BE05 – BE32 brakes" (page 115).

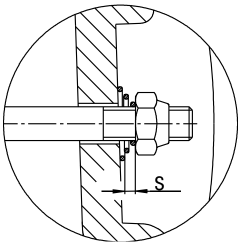
7. With manual brake release: Use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

WARNING

No braking due to incorrectly set floating clearance "s".

Severe or fatal injuries.

- Set the floating clearance "s" correctly according to the following figure and table so that the pressure plate can move up as the brake lining wears.



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Brake	Floating clearance s [mm]
BE05; BE1; BE2	1.5
BE5; BE11, BE20; BE30; BE32	2

8. Seal hex nuts [61] with duroplastic sealing compound, e.g. "SEW L Spezial" (page 146).
9. Mount sealing strip [66], clamping strap [157], and tie rods if applicable, re-install the removed parts.

INFORMATION

Replace setting nuts [58] and hex nuts [61] if the removal procedure is repeated.

8.6.13 Changing the magnet of BE05 – BE32 brakes

WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove the following:
   - Forced cooling fan and incremental encoder (if installed)

     See section "Motor and brake maintenance – preliminary work" (page 96).
   - Flange cover or fan guard [35], circlip [32/62] and fan [36]
2. Remove the brake cable
   - **BE05 – BE11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – BE32:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
3. **For BE05 and BE1:** Remove the tie rods of the motor

   Remove the sealing strip [66] and clamping straps [157]; remove manual brake release if necessary:
   - setting nuts [58], conical coil springs [57], studs [56], releasing lever [53], spiral dowel pin [59]
4. Unfasten hex nuts [61], remove complete magnet [54], remove brake springs [50/276].
5. Install new magnet with brake springs. For the possible braking torque steps, please refer to section "Technical Data" (page 126).
6. Clean the brake parts, check for damage, and replace if necessary.
7. Re-install the brake components
   - Leave out the fan and the fan guard, because the working air gap has to be set first, see chapter "Setting the working air gap of the BE05 – BE20 brakes".
8. Reseal the shaft:
   - Replace the sealing ring [95]

     Apply grease to the sealing lip (see chapter "Order information for lubricants and anti-corrosion agents" (page 146)).

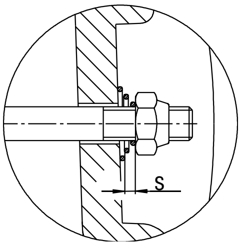
9. With manual brake release: Use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

⚠ WARNING

No braking due to incorrectly set floating clearance "s".

Severe or fatal injuries.

- Set the floating clearance "s" correctly according to the following figure and table so that the pressure plate can move up as the brake lining wears.



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Brake	Floating clearance s [mm]
BE05; BE1; BE2	1.5
BE5; BE11, BE20; BE30; BE32	2

10. Seal hex nuts [61] with duroplastic sealing compound, e.g. "SEW L Spezial" (page 146).
11. Mount sealing strip [66], clamping strap [157], and tie rods if applicable, re-install the removed parts.
12. Replace brake controller in the event of a brake failure due to an interturn short circuit or a short circuit to frame.

INFORMATION

Replace setting nuts [58] and hex nuts [61] if the removal procedure is repeated.

8.6.14 Replacing the brake of EDR.71 – EDR.80

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove the following:
   - Forced cooling fan and incremental encoder (if installed)

     See section "Motor and brake maintenance – preliminary work" (page 96).
   - Flange cover or fan guard [35], circlip [32/62] and fan [36]
2. Remove the terminal box cover and loosen the brake cable from the rectifier. If necessary, attach trailing wire to brake cables.
3. Loosen machine screws [13] and remove brake endshield with brake from stator.
4. Loosen the clamping straps [157] and store them.
5. Insert the brake cable of the new brake into the terminal box.
6. Install the new brake, observing the alignment of the cams of the brake endshield.
7. Mount the stored clamping straps [157] to the new brake.
8. Reseal the shaft:
   - Replace the sealing ring [95]

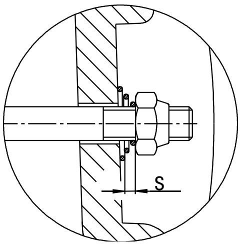
     Apply grease to the sealing lip (see chapter "Order information for lubricants and anti-corrosion agents" (page 146)).
9. With manual brake release: Use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

⚠ WARNING

No braking due to incorrectly set floating clearance "s".

Severe or fatal injuries.

- Set the floating clearance "s" correctly according to the following figure and table so that the pressure plate can move up as the brake lining wears.



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Brake	Floating clearance s [mm]
BE05; BE1; BE2	1.5

10. Seal hex nuts [61] with duroplastic sealing compound, e.g. "SEW L Spezial" (page 146).

8.6.15 Replacing the brake of EDR.90 – EDR.225

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Isolate the motor, brake, and forced cooling fan, if installed, from the power supply before starting work, safeguarding them against unintentional re-start.
- Carefully observe the steps described below.

1. Remove the following:
   - Forced cooling fan and incremental encoder (if installed)

     See section "Motor and brake maintenance – preliminary work" (page 96).
   - Flange cover or fan guard [35], circlip [32/62] and fan [36]
2. Remove the brake cable
   - **BE05 – BE11:** Remove the terminal box cover and unfasten the brake cable from the rectifier.
   - **BE20 – BE32:** Loosen safety screws of the brake plug connector [698] and remove plug connector.
3. Unfasten screws [900] and remove brake from brake endshield.
4. Loosen the clamping straps [157] and store them.
5. **EDR.90 – EDR.132:** Observe the alignment of the seal [901].
6. Connect the brake cables of the new brake.
7. Install the new brake, observing the alignment of the cams of the friction disk.
8. Mount the stored clamping straps [157] to the new brake.
9. Reseal the shaft:
   - Replace the sealing ring [95]

     Apply grease to the sealing lip (see chapter "Order information for lubricants and anti-corrosion agents" (page 146)).

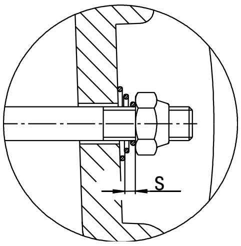
10. With manual brake release: Use setting nuts to set the floating clearance "s" between the conical coil springs (pressed flat) and the setting nuts (see following figure).

⚠ WARNING

No braking due to incorrectly set floating clearance "s".

Severe or fatal injuries.

- Set the floating clearance "s" correctly according to the following figure and table so that the pressure plate can move up as the brake lining wears.



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Brake	Floating clearance s [mm]
BE05; BE1; BE2	1.5
BE5; BE11, BE20, BE30, BE32	2

11. Seal hex nuts [61] with duroplastic sealing compound, e.g. "SEW L Spezial" (page 146).

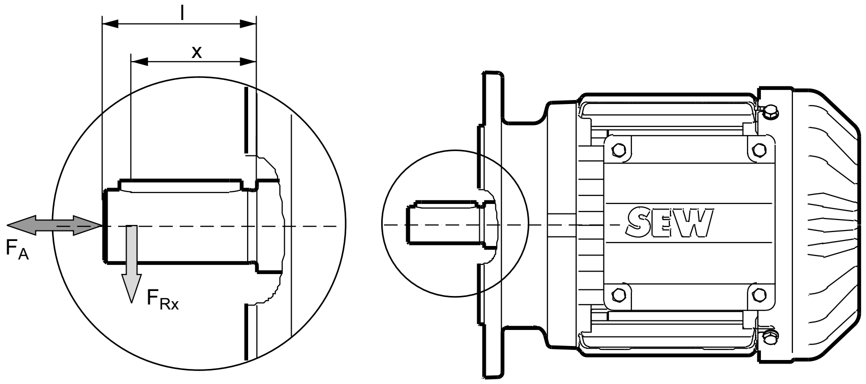
9 Technical Data

9.1 Overhung loads

9.1.1 Permitted overhung loads

Refer to the following diagrams for the permitted overhung load F_{Rx} for EDR AC brakemotors. In order to read the permitted overhung load from the diagram, you must know what the distance x is between the force application point of the overhung load F_R and the shaft shoulder.

The following figure shows the application point of the overhung load.



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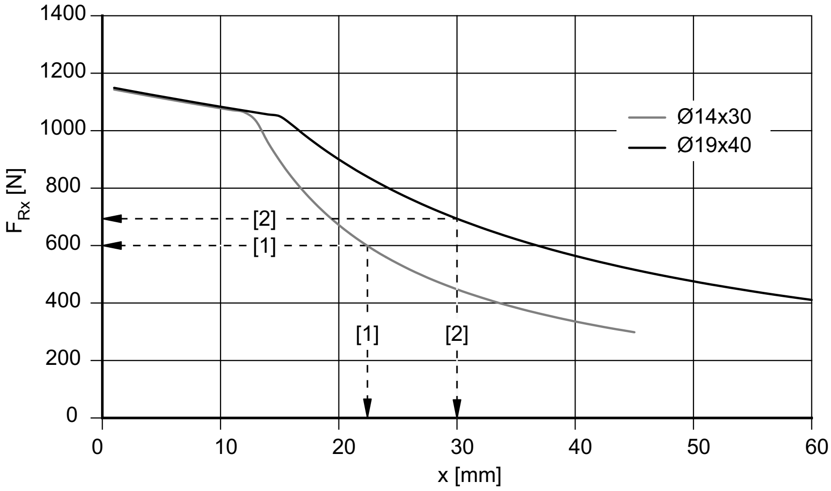
l = Length of the shaft end

x = Distance between overhung load application point and shaft shoulder

F_{Rx} = Overhung load at force application point

F_A = Axial force

The following diagram shows an example of how you can read the overhung load from the diagram:



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[1] Motor with shaft diameter 14 mm, force application x at 22 mm, permitted overhung load F_{Rx} = 600 N

[2] Motor with shaft diameter 19 mm, force application x at 30 mm, permitted overhung load F_{Rx} = 700 N

Permitted axial load for EDR motors

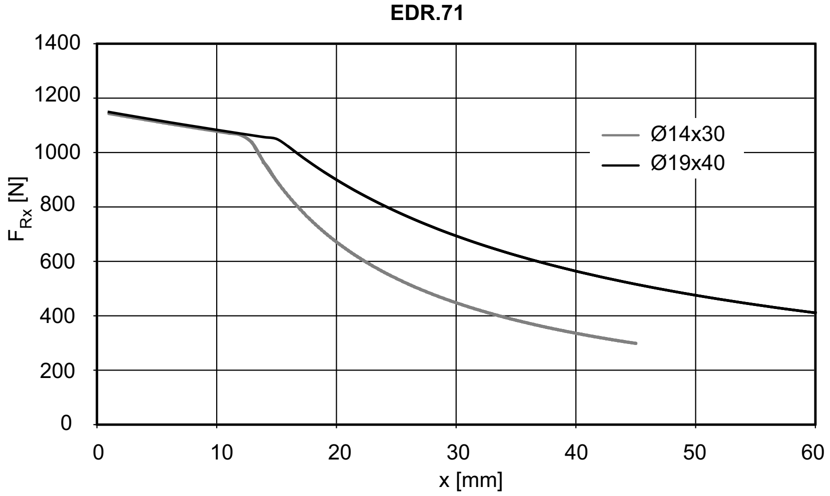
You can then determine the permitted axial load F_A by means of the previously determined overhung load F_{Rx}:

$F_A = 0.2 \times F_{Rx}$

9.1.2 Overhung load diagrams of the 4-pole EDR motors

Overhung load diagram EDR.71

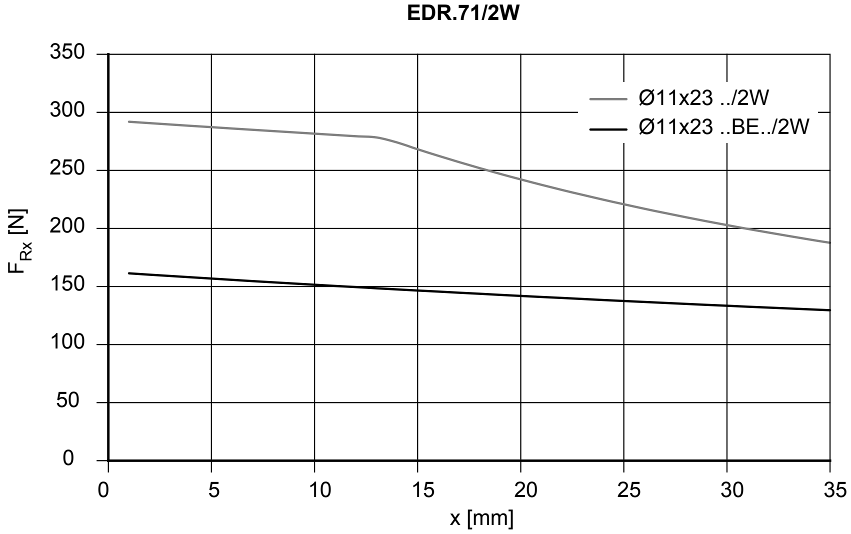
Overhung load diagram for 4-pole EDR.71 motors:



2637430411

Overhung load diagram EDR.71 on the 2. shaft end

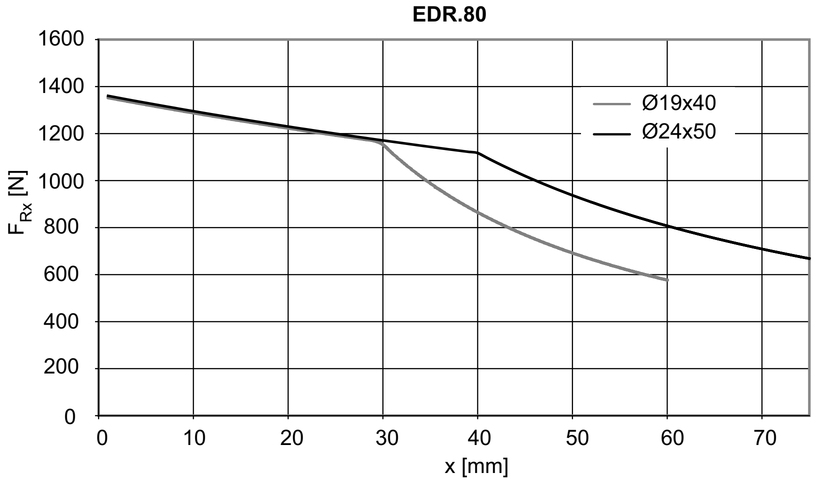
Overhung load diagram for 4-pole EDR.71 motors at 2. shaft end:



2636893835

Overhung load diagram EDR.80

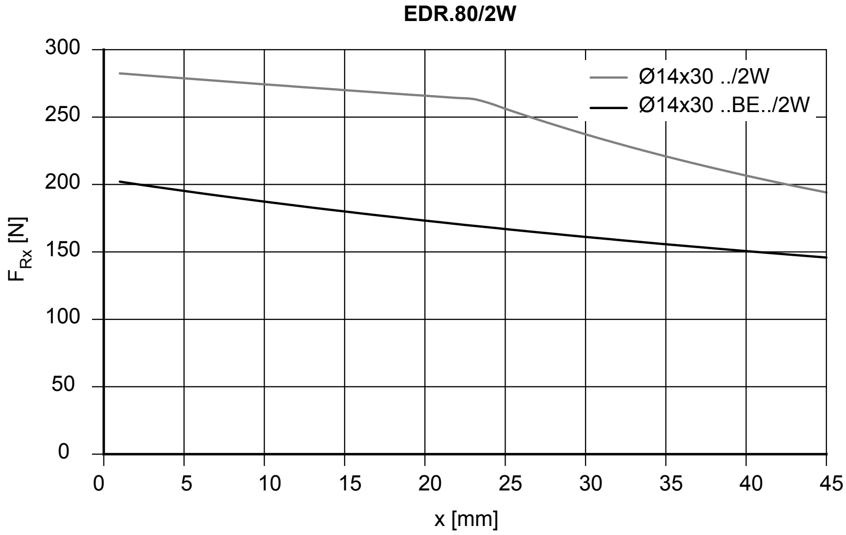
Overhung load diagram for 4-pole EDR.80 motors:



2636896523

Overhung load diagram EDR.80 on the 2. shaft end

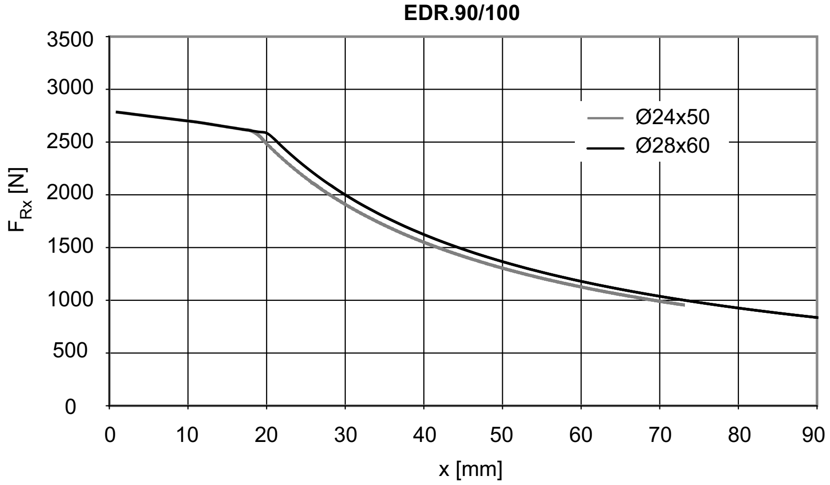
Overhung load diagram for 4-pole EDR.80 motors at 2. shaft end:



2636899211

Overhung load diagram EDR.90 and EDR.100

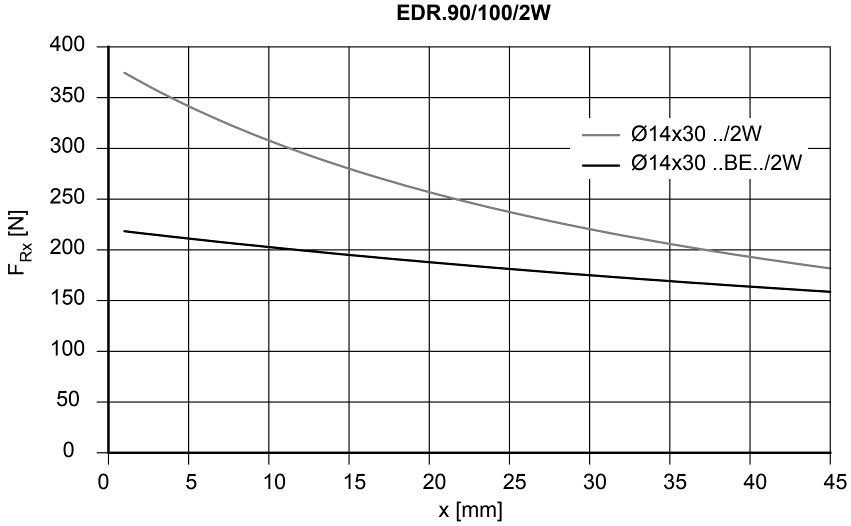
Overhung load diagram for 4-pole EDR.90 and EDR.100 motors:



2636901899

Overhung load diagram EDR.90 and EDR.100 at 2. shaft end

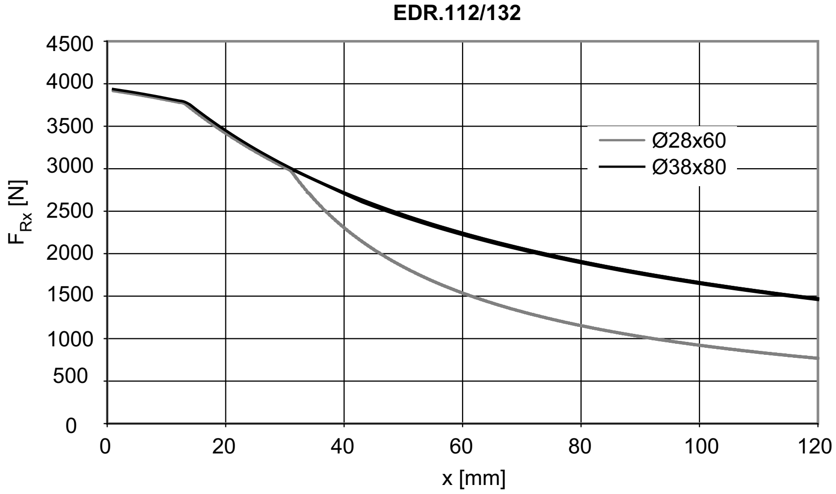
Overhung load diagram for 4-pole EDR.90 and EDR.100 motors at 2. shaft end:



2636904587

Overhung load diagram EDR.112 and EDR.132

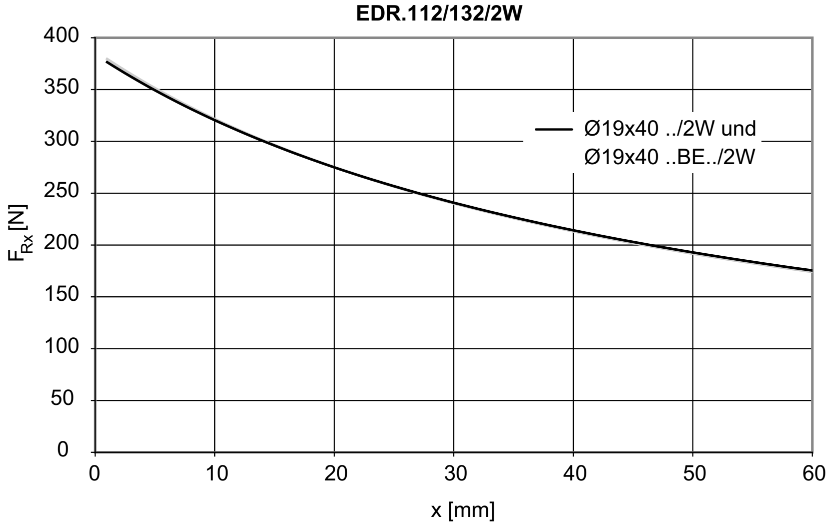
Overhung load diagram for 4-pole EDR.112 and EDR.132 motors:



2636907275

Overhung load diagram EDR.112 and EDR.132 at 2. shaft end

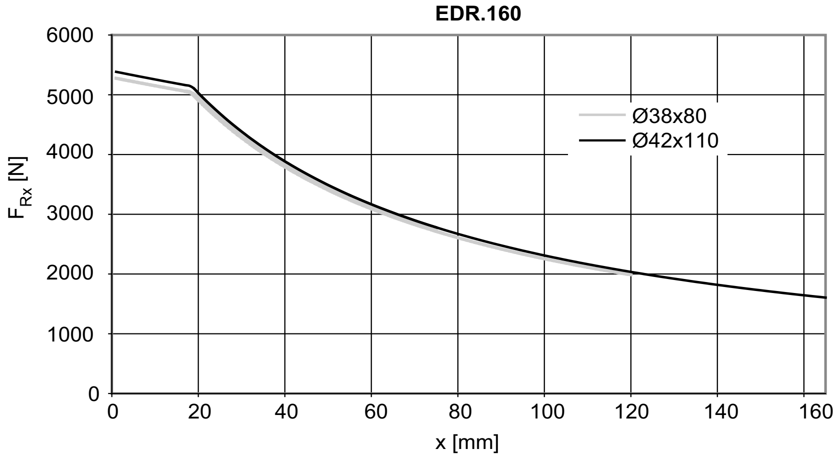
Overhung load diagram for 4-pole EDR.112 and EDR.132 motors at 2. shaft end:



2636909963

Overhung load diagram EDR.160

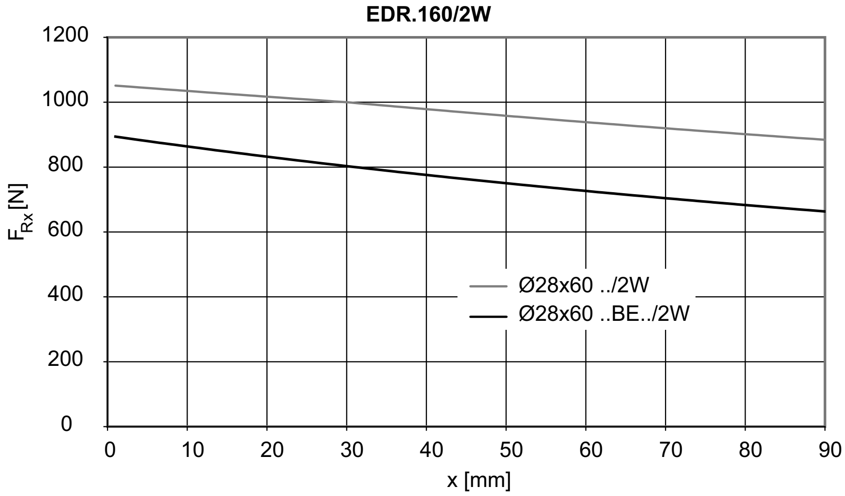
Overhung load diagram for 4-pole EDR.160 motors:



2636912651

Overhung load diagram EDR.160 on the 2. shaft end

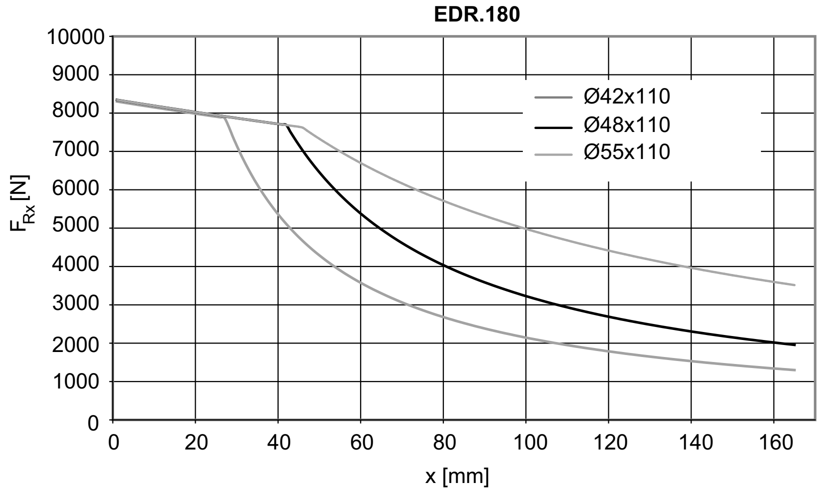
Overhung load diagram for 4-pole EDR.160 motors at 2. shaft end:



2636915339

Overhung load diagram EDR.180

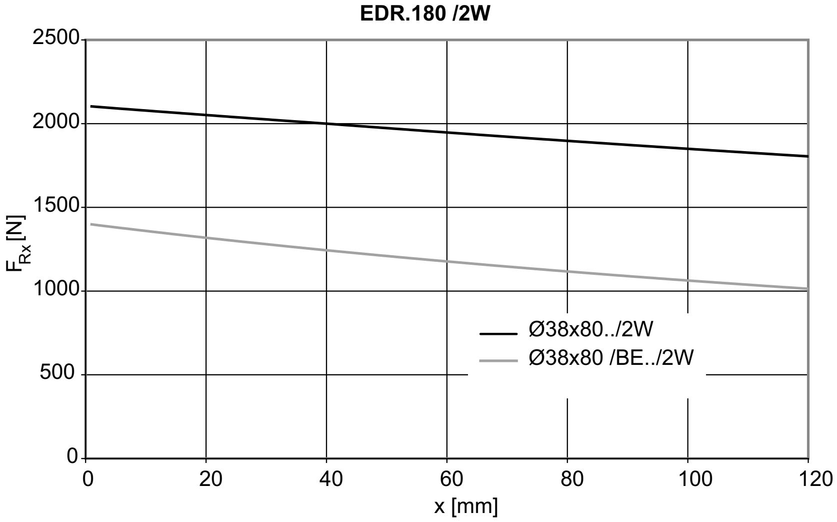
Overhung load diagram for 4-pole EDR.180 motors:



2636918027

Overhung load diagram EDR.180 on the 2. shaft end

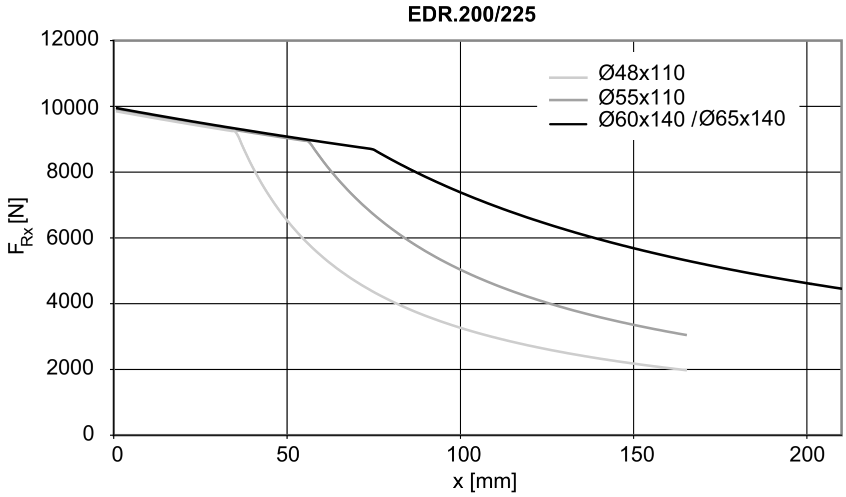
Overhung load diagram for 4-pole EDR.180 motors at 2. shaft end:



2636920715

Overhung load diagram EDR.200 and EDR.225

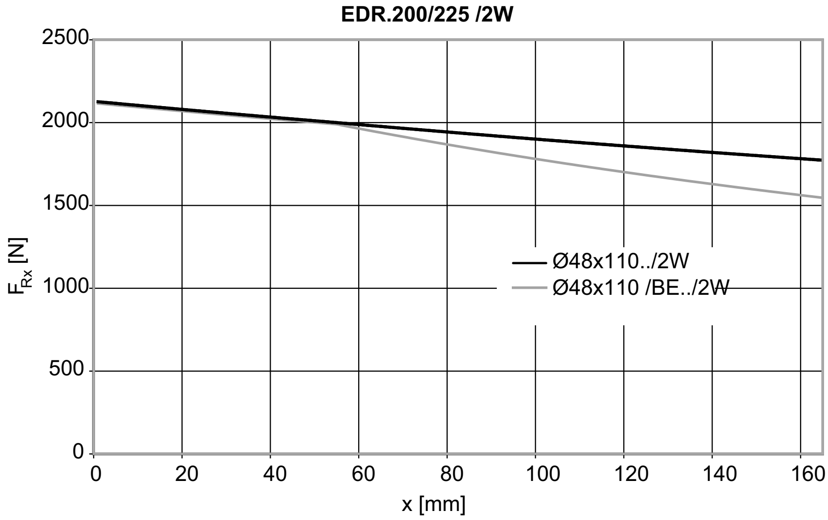
Overhung load diagram for 4-pole EDR.200 and EDR.225 motors:



2636923403

Overhung load diagram EDR.200 and EDR.225 at 2. shaft end

Overhung load diagram for 4-pole EDR.200 and EDR.225 motors at 2. shaft end:



2636926091

9.2 Braking torque assignment

9.2.1 Motor sizes EDR.71 – EDR.100

Motor type	Brake type	Braking torque steps [Nm (lb-in)]									
EDR.71	**BE05**	1.8 (16)	2.5 (22)	3.5 (31)							
	BE1				5.0 (44)	7.0 (62)					
EDR.80	**BE05**	1.8 (16)	2.5 (22)	3.5 (31)							
	BE1				5.0 (44)	7.0 (62)					
	BE2				5.0 (44)	7.0 (62)	10 (88.5)	14 (124)			
EDR.90	**BE1**				5.0 (44)	7.0 (62)					
	BE2				5.0 (44)	7.0 (62)	10 (88)	14 (124)			
	BE5							14 (124)	20 (177)	28 (248)	40 (354)
EDR.100	**BE2**				5.0 (44)	7.0 (62)	10 (88)	14 (124)			
	BE5							14 (124)	20 (177)	28 (248)	40 (354)

9.2.2 Motor sizes EDR.112 – EDR.225

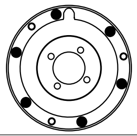
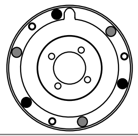
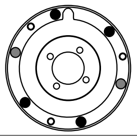
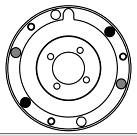
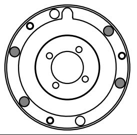
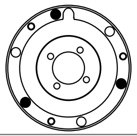
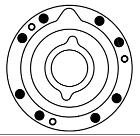
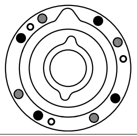
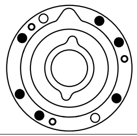
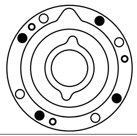
Motor type	Brake type	Braking torque steps [Nm (lb-in)]										
EDR.112	**BE5**	14 (124)	20 (180)	28 (248)	40 (354)							
	BE11			20 (180)	40 (354)	55 (487)	80 (708)					
EDR.132	**BE5**			28 (248)	40 (354)							
	BE11			20 (180)	40 (354)	55 (487)	80 (708)					
EDR.160	**BE11**			20 (180)	40 (354)	55 (487)	80 (708)					
	BE20				40 (354)	55 (487)	80 (708)	110 (974)	150 (1328)			
EDR.180	**BE20**				40 (354)	55 (487)	80 (708)	110 (974)	150 (1328)			
	BE30						75 (667)	100 (885)	150 (1328)	200 (1770)		
	BE32							100 (885)	150 (974)	200 (1770)	300 (2655)	
EDR.200/ 225	**BE30**						75 (667)	100 (885)	150 (974)	200 (1770)		
	BE32							100 (885)	150 (1328)	200 (1770)	300 (2655)	400 (3540)

9.3 Work done, working air gap, braking torques

Brake Type	Braking work until Maintenance	Working air gap [mm]		Brake disk [mm]	Part number damping plate/pole sheet	Braking torque settings				
						Braking torque	Type and number of brake springs		Order number of brake springs	
	[10^6 J]	min. [1]	max.	min.		[Nm (lb-in)]	Standard	Blue	Standard	Blue
BE05	60	0.25	0.6	9.0	1374 056 3	3.5 (31)	–	6	0135 017 X	1374 137 3
						2.5 (22)	–	4		
						1.8 (16)	–	3		
BE1	60	0.25	0.6	9.0	1374 056 3	7.0 (62)	4	2	0135 017 X	1374 137 3
						5.0 (44)	3	–		
BE2	90	0.25	0.6	9.0	1374 019 9	14 (124)	2	4	1374 024 5	1374 052 0
						10 (88.5)	2	2		
						7.0 (62)	–	4		
						5.0 (44)	–	3		
BE5	190	0.25	0.6	9.0	1374 069 5	40 (354)	2	4	1374 070 9	1374 071 7
						28 (248)	2	2		
						20 (177)	–	4		
						14 (124)	–	3		
BE11	320	0.3	0.9	10.0	1374 171 3	80 (708)	2	4	1374 183 7	1374 184 5
						55 (487)	2	2		
						40 (354)	–	4		
					1374 171 3 + 1374 699 5	20 (177)	–	3		
BE20	500	0.3	0.9	10.0	–	150 (1328)	4	2	1374 322 8	1374 248 5
						110 (974)	3	3		
						80 (708)	3	–		
						55 (487)	–	4		
					1374 675 8	40 (354)	–	3		
BE30	750	0.3	0.9	10.0	–	200 (1770)	4	4	0187 455 1	1374 435 6
						150 (1328)	4	–		
						100 (885)	–	8		
						75 (667)	–	6		
BE32	750	0.4	0.9	10.0	–	400 (3540)	4	4	0187 455 1	1374 435 6
						300 (2655)	4	–		
						200 (1770)	–	8		
						150 (1328)	–	6		
					1374 673 1	100 (885)	–	4		

[1] When checking the working air gap, note: Parallelism tolerances on the brake disk may cause deviations of ± 0.15 mm after a test run.

The following table shows the brake spring layout:

BE05 – BE20:					
6 springs	3 + 3 springs	4 + 2 springs	2 + 2 springs	4 springs	3 springs
					
BE30 – BE32:					
8 springs	4 + 4 springs	6 springs	4 springs		
					

9.4 *Operating currents*

9.4.1 Brake BE05, BE1, BE2

The current values I_H (holding current) listed in the tables are r.m.s. values. Use only appropriate instruments for measuring r.m.s. values. The inrush current (accelerator current) I_B only flows for a short time (ca. 160 ms) when the brake is released. There is no increased inrush current if a BMS brake rectifier is used or if there is a direct DC voltage supply – only possible with brakes up to size BE2.

	BE05, BE1	**BE2**
Max. braking torque [Nm (lb-in)]	3.5/7 (31/62)	14 (1566)
Braking power [W (hp)]	25 (0.034)	34 (0.046)
Inrush current ratio I_B/I_H	4	4

Nominal voltage V_N		**BE05, BE1**		**BE2**	
AC V	**DC V**	**I_H [AC A]**	**I_G [DC A]**	**I_H [AC A]**	**I_G [DC A]**
60 (57-63)	**24**	0.64	0.83	0.85	1.09
120 (111-123)	**48**	0.32	0.42	0.42	0.54
147 (139-159)	**60**	0,26	0.33	0,34	0.43
184 (174-193)	**80**	0.20	0.26	0.27	0.34
208 (194-217)	**90**	0.18	0.24	0.24	0.31
230 (218-243)	**96**	0.16	0.21	0.22	0.28
254 (244-273)	**110**	0.14	0.19	0.19	0.24
290 (274-306)	**125**	0.13	0.17	0.17	0.22
330 (307-343)	**140**	0.11	0.15	0.15	0.20
360 (344-379)	**160**	0.10	0.13	0.13	0.17
400 (380-431)	**180**	0.09	0.12	0.12	0.16
460 (432-484)	**200**	0.08	0.11	0.11	0.14
500 (485-542)	**220**	0.07	0.09	0.10	0.13

Key

I_B	Acceleration current – brief inrush current
I_H	Holding current r.m.s. value in the supply cable to the SEW brake rectifier
I_G	Direct current with direct DC voltage supply
V_N	Nominal voltage (nominal voltage range)

9.4.2 Brakes BE5, BE11, BE20, BE30, BE32

The current values I_H (holding current) listed in the tables are r.m.s. values. Use only appropriate instruments for measuring r.m.s. values. The inrush current (accelerator current) I_B only flows for a short time (ca. 160 ms) when the brake is released. A direct DC voltage supply is not possible.

	BE5	BE11	BE20	BE30, BE32
Max. braking torque [Nm (lb-in)]	40 (354)	80 (708)	150 (1328)	200/400 (1770/3540)
Braking power [W (hp)]	39 (0.052)	61 (0.081)	79 (0.106)	103 (0.138)
Inrush current ratio I_B/I_H	5.7	6.6	7	10

Nominal voltage V_N		**BE5**		**BE11**		**BE20**		**BE30, BE32**	
AC V	**DC V**	**I_H [AC A]**	**I_G [DC A]**	**I_H [AC A]**	**I_G [DC A]**	**I_H [AC A]**	**I_G [DC A]**	**I_H [AC A]**	**I_G [DC A]**
60 (57-63)	**24**	1.00	1.30	1.50	1.95	1.80	2.34	–	–
120 (111-123)	–	0.46	–	0.74	–	0.91	–	1.19	–
147 (139-159)	–	0.36	–	0.59	–	0.73	–	0.94	–
184 (174-193)	–	0.29	–	0.47	–	0.65	–	0.75	–
208 (194-217)	–	0.26	–	0.42	–	0.52	–	0.67	–
230 (218-243)	–	0.23	–	0.37	–	0.46	–	0.60	–
254 (244-273)	–	0.21	–	0.33	–	0.41	–	0.54	–
290 (274-306)	–	0.18	–	0.30	–	0.36	–	0.47	–
330 (307-343)	–	0.16	–	0.26	–	0.32	–	0.42	–
360 (344-379)	–	0.15	–	0.24	–	0.29	–	0.38	–
400 (380-431)	–	0.13	–	0.21	–	0.26	–	0.34	–
460 (432-484)	–	0.12	–	0.19	–	0.23	–	0.30	–
500 (485-542)	–	0.10	–	0.17	–	0.21	–	0.27	–

Key

I_B	Acceleration current – brief inrush current
I_H	Holding current r.m.s. value in the supply cable to the SEW brake rectifier
I_G	Direct current with direct DC voltage supply
V_N	Nominal voltage (nominal voltage range)

9.5 Resistors

9.5.1 Brake BE05, BE1, BE2

	BE05, BE1	BE2
Max. braking torque [Nm (lb-in)]	3.5/7 (31/62)	14 (1566)
Braking power [W (hp)]	25 (0.034)	34 (0.046)
Inrush current ratio I_B/I_H	4	4

Nominal voltage V_N		BE05, BE1		BE2	
AC V	**DC V**	R_B	R_T	R_B	R_T
60 (57-63)	**24**	6.2	18.7	4.55	13.8
120 (111-123)	**48**	24.5	75	18.2	55
147 (139-159)	**60**	39	118	29	87
184 (174-193)	**80**	62	187	45.5	139
208 (194-217)	**90**	78	235	58	174
230 (218-243)	**96**	98	295	72	220
254 (244-273)	**110**	124	375	91	275
290 (274-306)	**125**	156	470	115	350
330 (307-343)	**140**	196	590	144	440
360 (344-379)	**160**	245	750	182	550
400 (380-431)	**180**	310	940	230	690
460 (432-484)	**200**	390	1180	280	860
500 (485-542)	**220**	490	1490	355	1080

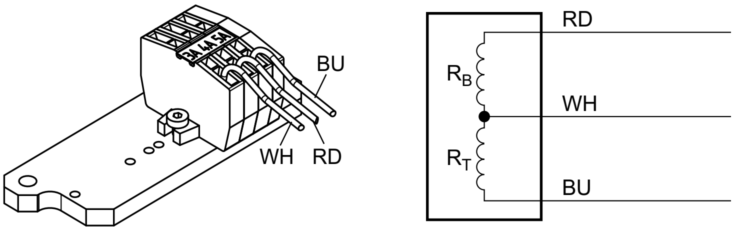
9.5.2 Brakes BE5, BE11, BE20, BE30, BE32

	BE5	BE11	BE20	BE30, BE32
Max. braking torque [Nm (lb-in)]	40 (354)	80 (708)	150 (1328)	200/400 (1770/3540)
Braking power [W (hp)]	39 (0.052)	61 (0.081)	79 (0.106)	103 (0.138)
Inrush current ratio I_B/I_H	5.7	6.6	7	10

Nominal voltage V_N		BE5		BE11		BE20		BE30, BE32	
AC V	**DC V**	R_B	R_T	R_B	R_T	R_B	R_T	R_B	R_T
60 (57-63)	**24**	2.75	13.2	1.5	8.7	1.1.	7.2	–	–
120 (111-123)	**–**	11	53	6.2	34.5	4.25	28.5	2.9	21.5
147 (139-159)	**–**	17.4	83	9.8	55.0	6.8	45.5	4.6	34.5
184 (174-193)	**–**	27.5	132	15.5	87	10.7	72	7.3	54
208 (194-217)	**–**	34.5	166	19.5	110	13.5	91	9.2	69
230 (218-243)	**–**	43.5	210	24.5	138	17.0	114	11.6	86
254 (244-273)	**–**	55	265	31.0	174	21.5	144	14.6	109
290 (274-306)	**–**	69	330	39.0	220	27	181	18.3	137
330 (307-343)	**–**	87	420	49	275	34	230	23	172
360 (344-379)	**–**	110	530	62	345	42.5	285	29	215
400 (380-431)	**–**	138	660	78	435	54	360	36.5	275
460 (432-484)	**–**	174	830	98	550	68	455	46	345
500 (485-542)	**–**	220	1050	119	670	85	570	58	430

9.5.3 Resistance measurement BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32

The following figure shows the resistance measurement at the ends of the brake coil in the terminal box:



R_B	Acceleration coil resistance at 20 °C (68 °F) [Ω]	RD	Red
R_T	Coil section resistance at 20 °C (68 °F) [Ω]	WH	White
		BU	Blue

INFORMATION

The colored cores of the brake coil must be loosened for the resistance measurement.

9.6 Brake control

The table below shows the standard and optional combinations of brakes and brake rectifiers for installation in control cabinets:

Type	BE05	BE1	BE2	BE5	BE11	BE20	BE30, BE32
BMS	X	X	X	–	–	–	–
BME	X	X	X	X	X	X	X
BMH	X	X	X	X	X	X	X
BMP	X	X	X	X	X	X	X
BMK	X	X	X	X	X	X	X
BMV	X	X	X	X	X	X	–

X	Optional
–	Not permitted

The following table lists the technical data of brake control systems for installation in the control cabinet, and the assignment regarding the motor size and connection technology. The different housings have different colors (= color code) to make them easier to distinguish.

Type	Function	Voltage	Holding current I_{Hmax} [A]	Size	Part number	Color code
BMS	One-way rectifier without electronic switching	AC 150...500 V	1.5	BMS 1.5	825 802 3	Black
		AC 42...150 V	3.0	BMS 3	825 803 1	Brown
BME	One-way rectifier with electronic switching	AC 150...500 V	1.5	BME 1.5	825 722 1	Red
		AC 42...150 V	3.0	BME 3	825 723 X	Blue
BMH	One-way rectifier with electronic switching and heating function	AC 150...500 V	1.5	BMH 1.5	825 818 X	Green
		AC 42...150 V	3.0	BMH 3	825 819 8	Yellow
BMP	One-way rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit	AC 150...500 V	1.5	BMP 1.5	825 685 3	White
		AC 42...150 V	3.0	BMP 3	826 566 6	Light blue
BMK	One-way rectifier with electronic switching, DC 24 V control input and cut-off in the DC circuit	AC 150...500 V	1.5	BMK 1.5	826 463 5	Water blue
		AC 42...150 V	3.0	BMK 3	826 567 4	Bright red
BMV	Brake control unit with electronic switching, DC 24 V control input and fast cut-off	DC 24 V	5.0	BMV 5	1 300 006 3	White

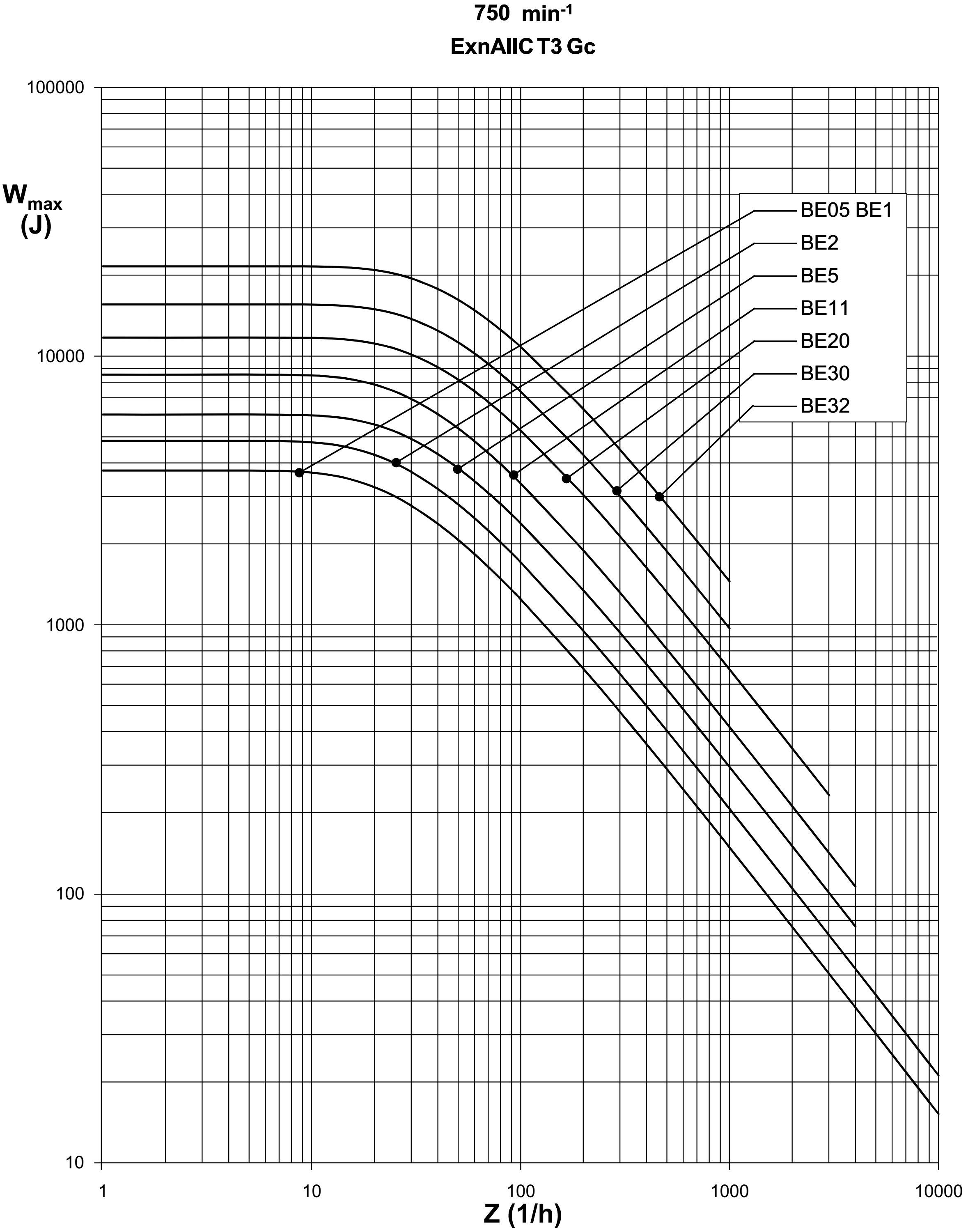
INFORMATION

Brake control systems are not allowed in the connection space of EDR motors.

In the EDR motors, the brake is wired to the terminal board, see chapter "Resistance measurement BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32" (page 139).

9.7 Permitted work done by the BE brake for AC motors

If you are using a brake motor, you have to check whether the brake is approved for use with the required starting frequency Z. The following diagrams show the permitted braking work W_{max} per braking operation for different brakes and rated speeds. The values are given with reference to the required switching frequency Z in cycles/hour (1h).



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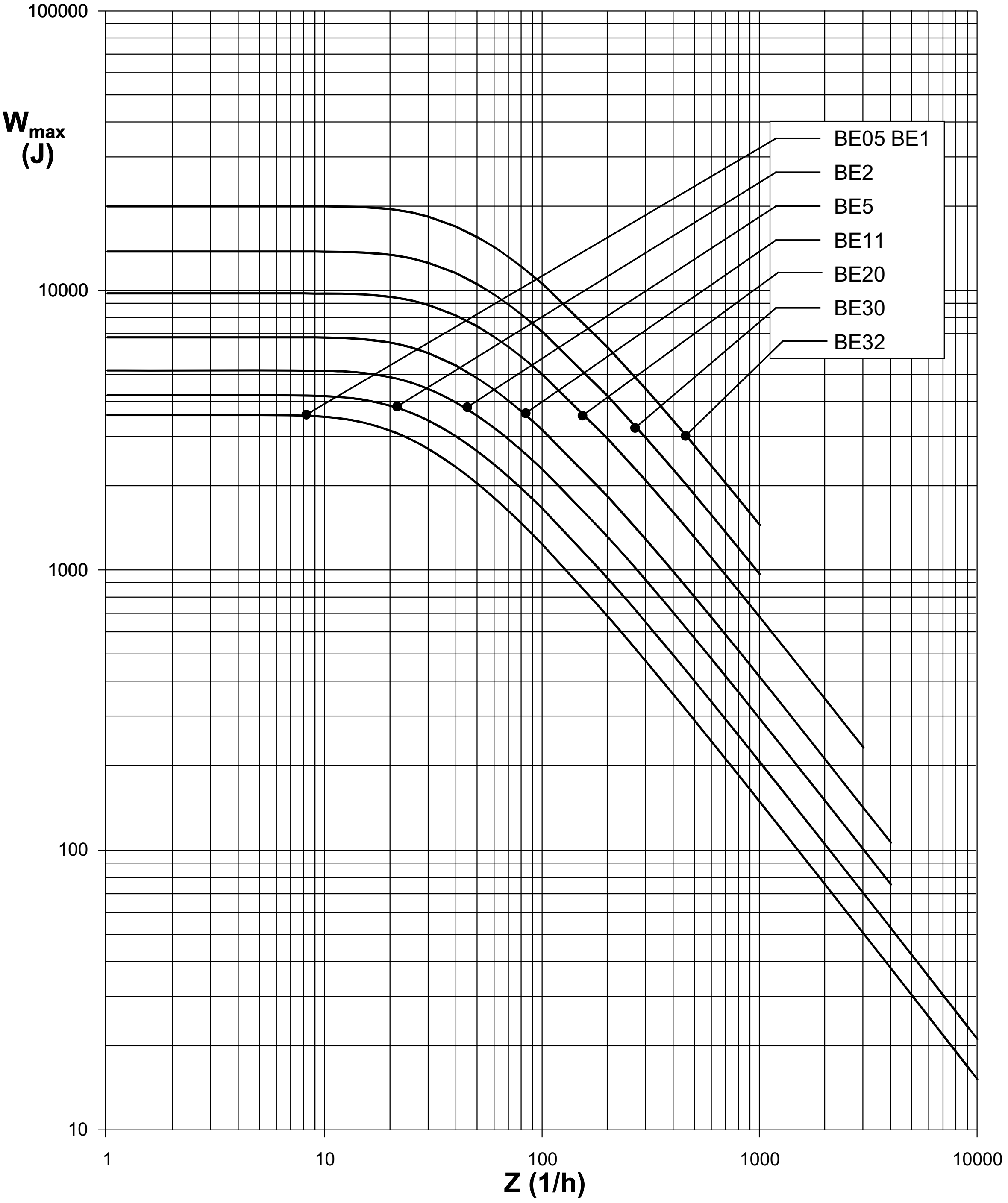
1000 min^{-1}
ExnAIIC T3 Gc



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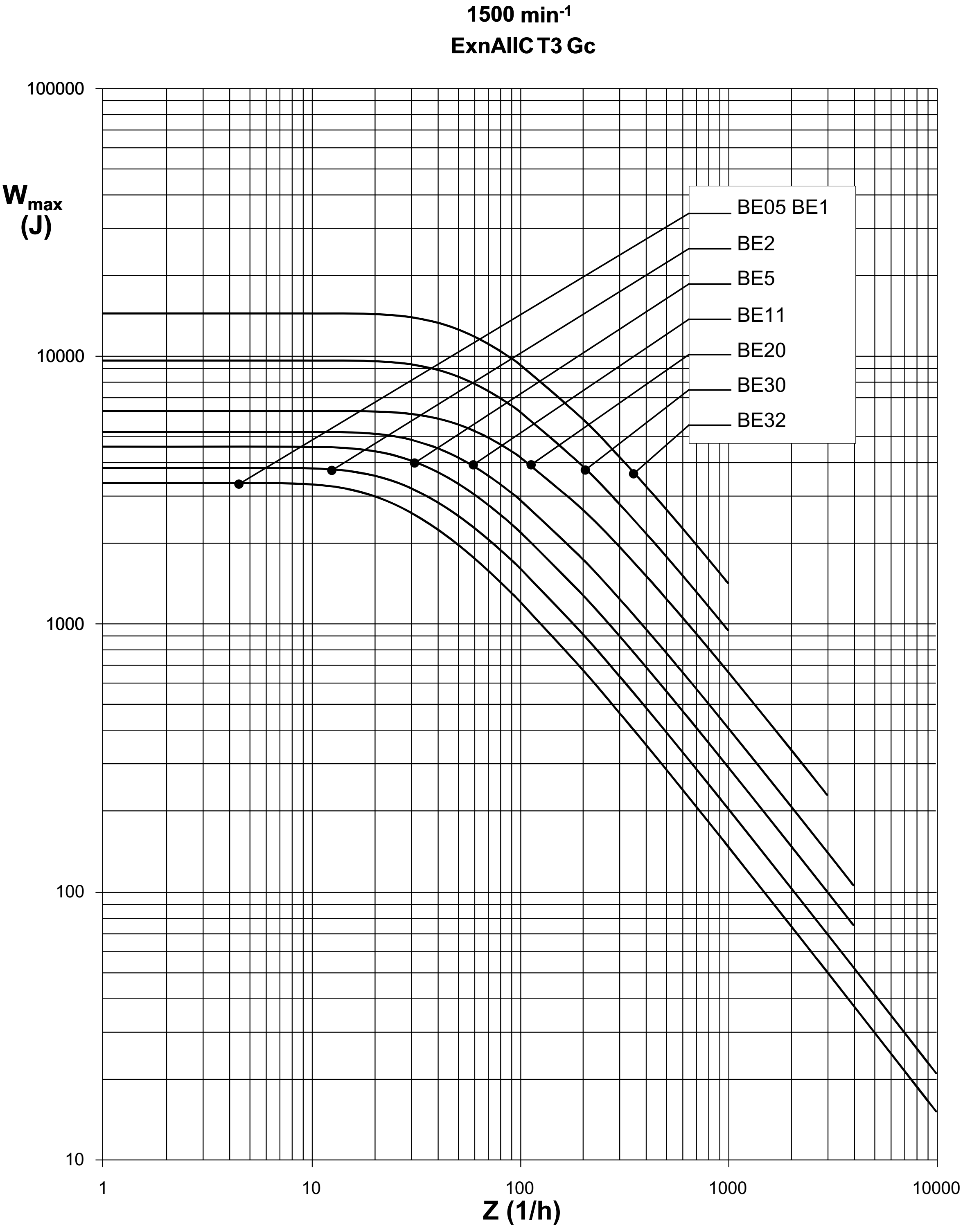
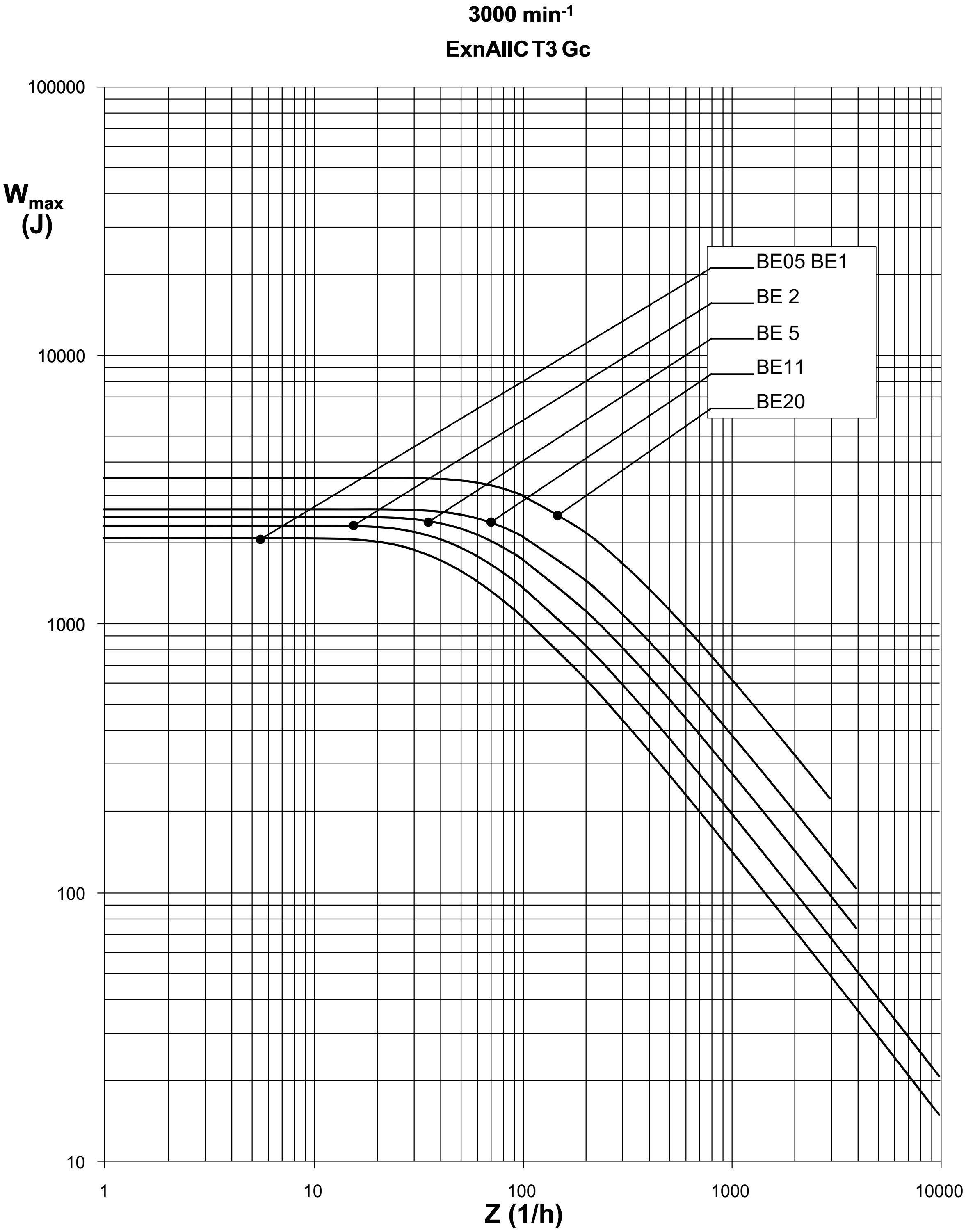

1500 min⁻¹
ExnAIIC T3 Gc
Wmax (J)
100000
10000
1000
100
10
1
10
100
1000
10000
Z (1/h)
BE05 BE1
BE2
BE5
BE11
BE20
BE30
BE32

3872851595



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INFORMATION

For brakes BE30 and BE32, braking operations from 3000 rpm are not permitted.

9.8 *Permitted rolling bearing types*

9.8.1 Rolling bearing types for EDR.71 – EDR.225 motors

Motor type	A-side bearing		B-side bearing	
	IEC motor	Gearmotor	AC motor	Brakemotor
EDR.71	6204-2Z-J-C3	6303-2Z-J-C3	6203-2Z-J-C3	6203-2RS-J-C3
EDR.80	6205-2Z-J-C3	6304-2Z-J-C3	6304-2Z-J-C3	6304-2RS-J-C3
EDR.90 – EDR.100	6306-2Z-J-C3		6205-2Z-J-C3	6205-2RS-J-C3
EDR.112 – EDR.132	6308-2Z-J-C3		6207-2Z-J-C3	6207-2RS-J-C3
EDR.160	6309-2Z-J-C3		6209-2Z-J-C3	6209-2RS-J-C3
EDR.180	6312-2Z-J-C3		6213-2Z-J-C3	6213-2RS-J-C3
EDR.200 – EDR.225	6314-2Z-J-C3		6314-2Z-J-C3	6314-2RS-J-C3

9.8.2 Current insulated rolling bearings for motor sizes EDR.200 – EDR.225

Motor type	AC motor	Brakemotor
EDR.200 – EDR.225	6314-C3-EI	6314-C3-EI

9.9 Lubricant tables

9.9.1 Lubricant table for rolling bearings

INFORMATION

Using the wrong bearing grease might result in increased motor noise.

Motor sizes EDR.71 – EDR.225

The bearings are 2Z or 2RS closed bearings and cannot be re-lubricated.

	Ambient temperature	Manufacturer	Type	DIN designation
Motor rolling bearings	-20 °C to +60 °C	Esso	Polyrex EM1)	K2P-20
	-40 °C to +60 °C	Kyodo Yushi	Multemp SRL2)	K2N-40

1) mineral lubricant (= mineral-based rolling bearing grease)

9.10 Order information for lubricants and anti-corrosion agents

Lubricants and anti-corrosion agents may be obtained directly from SEW-EURODRIVE using the following order numbers.

Use	Manufacturer	Type	Packaging unit	Order number
Lubricant for rolling bearings	Esso	Polyrex EM	400 g	09101470
	SKF	GXN	400 g	09101276
Duroplastic sealing compound	Marston Domsel	SEW L Spezial	80 g	09112286
Lubricant for Sealing rings	Klüber	Klübersynth HLR 46-371 for [95]	On request	On request
	Klüber	Petamo GHY 133 for [30], [37], [106]	10 g	04963458
	Fuchs	Renolit CX-Tom 15 for [30], [37], [106]	On request	On request
Anti-corrosion agent and lubricant	SEW-EURODRIVE	NOCO® FLUID	5.5 g	09107819

9.11 *Encoders*

9.11.1 Encoders ES7. /AS7. / EG7. and AG7.

This table shows the general technical data for the encoders:

Designation	**Value**
Operating ambient temperature for the motor	-20 °C to +40 °C
Storage temperature	-15 °C to +70 °C
Maximum angular acceleration	10^4 rad/s^2

9.11.2 Incremental rotary encoders with spread and plug-in shaft

Encoder type		**ES7S**	**EG7S**	**ES7R**	**EV7R**	**EG7R**	**ES7C**	**EV7C**	**EG7C**
For motors		EDR.71 – 132	EDR.160 – 225	EDR.71 – 132		EDR.160 – 225	EDR.71 – 132		EDR.160 – 225
Supply voltage	V_B	DC 7 V – 30 V		DC 7 – 30 V			DC 4.75 – 30 V		
Max. current consumption	I_{in}	140 mA_{RMS}		160 mA_{RMS}			240 mA_{RMS}		
Max. pulse frequency	f_{max}	150 kHz		120 kHz			120 kHz		
Periods per revolution	A, B	1024		1024			1024		
	C	1		1			1		
Output amplitude per track	V_{high}	1 V_{SS}		≥ DC 2.5 V			≥ DC 2.5 V		
	V_{low}			≤ DC 0.5 V			≤ DC 1.1 V		
Signal output		Sin/cos		TTL			HTL		
Output current per track	I_{out}	10 mA_{RMS}		25 mA_{RMS}			60 mA_{RMS}		
Mark space ratio		Sin/cos		1 : 1 ± 10 %			1 : 1 ± 10 %		
Phase angle A: B		90 ° ± 3 °		90 ° ± 20 °			90 ° ± 20 °		
Vibration resistance		≤ 100 m/s²		≤ 100 m/s²		≤ 200 m/s²	≤ 100 m/s²		
Shock resistance		≤ 1000 m/s²	≤ 2000 m/s²	≤ 1000 m/s²		≤ 2000 m/s²	≤ 1000 m/s²		≤ 2000 m/s²
Maximum speed	n_{max}	6000 rpm		6000 rpm			6000 rpm		
Degree of protection		IP66		IP66			IP66		
Connection		Terminal box on incremental encoder		Terminal box on incremental encoder			Terminal box on incremental encoder		

9.11.3 Encoders AS7Y, AG7Y and AV7Y

Encoder type		**AV7Y**	**AS7Y**	**AG7Y**
For motors		EDR.71 – 132		EDR.160 – 225
Supply voltage	V_B	DC 7 – 30 V		
Max. current consumption	I_{in}	140 mA_{RMS}		
Max. pulse frequency	f_{max}	200 kHz		
Periods per revolution	A, B	2048		
	C	-		
Output amplitude per track	V_{high}	1 V_{SS}		
	V_{low}			
Signal output		Sin/cos		
Output current per track	I_{out}	10 mA_{RMS}		
Mark space ratio		Sin/cos		
Phase angle A: B		90 ° ± 3 °		
Scanning code		Gray code		
Single-turn resolution		4096 increments / revolution		
Multi-turn resolution		4096 revolutions		
Data transfer		synchronous-serial		
Serial data output		Driver according to EIA RS-422		
Serial clock input		Recommended receiver to EIA RS-422		
Pulse frequency		Permitted range: 100 – 2000 kHz (max. 100 m cable length with 300 kHz)		

Encoder type	AV7Y	AS7Y	AG7Y
Clock-pulse space period	12 – 30 µs		
Vibration resistance	≤ 100 m/s²		
Shock resistance	≤ 1000 m/s²		≤ 2000 m/s²
Maximum speed n_{max}	6000 rpm		
Degree of protection	IP66		
Connection	Terminal strip in pluggable connection cover		

9.11.4 Encoders AV7W, AS7W and AG7W

Encoder type		AV7W	AS7W	AG7W
For motors		EDR.71 – 132		EDR.160 – 225
Supply voltage	V_B	DC 7 – 30 V		
Max. current consumption	I_{in}	150 mA_{RMS}		
Max. pulse frequency	f_{max}	200 kHz		
Periods per revolution	A, B	2048		
	C	-		
Output amplitude per track	V_{high}	1 V_{SS}		
	V_{low}			
Signal output		Sin/cos		
Output current per track	I_{out}	10 mA_{RMS}		
Mark space ratio		Sin/cos		
Phase angle A: B		90° ± 3°		
Scanning code		Binary code		
Single-turn resolution		8192 increments / revolution		
Multi-turn resolution		65536 revolutions		
Data transfer		RS485		
Serial data output		Driver according to EIA RS-485		
Serial clock input		Recommended driver to EIA RS-422		
Pulse frequency		9600 baud		
Clock-pulse space period		-		-
Vibration resistance		≤ 100 m/s²		≤ 200 m/s²
Shock resistance		≤ 1000 m/s²		≤ 2000 m/s²
Maximum speed	n_{max}	6000 rpm		
Degree of protection		IP66		
Connection		Terminal strip in pluggable connection cover		

9.11.5 Incremental rotary encoders with solid shaft

Encoder type		**EV2T**	**EV2S**	**EV2R**	**EV2C**	**EV7S**
For motors		EDR.71 – EDR.225				
Supply voltage	V_B	DC 5 V	DC 9 V – 26 V			DC 7 V – 30 V
Max. current consumption	I_{in}	160 mA_{RMS}	140 mA_{RMS}	160 mA_{RMS}	240 mA_{RMS}	140 mA_{RMS}
Max. pulse frequency	f_{max}	120 kHz				150 kHz
Periods per revolution	A, B	1024				
	C	1				
Output amplitude per track	V_{high}	≤ DC 2.5 V	1 V_{SS}	≤ DC 2.5 V	≤ V_B DC - 3.5 V	1 V_{SS}
	V_{low}	≤ DC 0.5 V		≤ DC 0.5 V	≤ DC 1.5 V	
Signal output		TTL	Sin/cos	TTL	HTL	Sin/cos
Output current per track	I_{out}	25 mA_{RMS}	10 mA_{RMS}	25 mA_{RMS}	60 mA_{RMS}	10 mA_{RMS}
Mark space ratio		1 : 1 ± 20 %	Sin/cos	1 : 1 ± 20 %		Sin/cos
Phase angle A: B		90 ° ± 20 °	90 °	90 ° ± 20 °		90 ° ± 3 °
Data memory		-				
Vibration resistance		≤ 100 m/s²				
Shock resistance		≤ 1000 m/s²				
Maximum speed	n_{max}	6000 rpm				
Mass	m	0.36 kg				
Degree of protection		IP66				
Connection		Terminal box on incremental encoder				

9.11.6 Mounting device

Mounting device		**XV0A**	**XV1A**	**XV2A**	**XV3A**	**XV4A**
For motors		EDR71 – 225				
Mounting type of encoder		Flange centered with coupling				
Variant	Encoder shaft	Any	6 mm	10 mm	12 mm	11 mm
	Centering	Any	50 mm	50 mm	80 mm	85 mm
Suitable for encoder		Provided by the customer or by SEW-EURODRIVE on behalf of the customer.				

9.12 *Nameplate marking*

The following table lists all markings that can occur on a nameplate and an explanation of what they mean:

Mark	**Meaning**
CE	CE mark to state compliance with European guidelines, such as the Low Voltage Directive
Ex	ATEX mark to state compliance with the European Directive 94/9/EC
VIK	VIK mark to confirm the compliance with the directive of the German Association of Industrial Machines (V.I.K.)

10 Malfunctions

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- De-energize the motor before you start working on the unit.
- Secure the motor against unintended power-up.

⚠ CAUTION

The surface temperatures on the drive can be very high during operation.

Danger of burns.

- Let the motor cool down before you start your work.

NOTICE

Improper troubleshooting measures may damage the drive.

Possible damage to property.

- Note the following information.

- Use only genuine spare parts in accordance with the valid parts list.
- Strictly observe the safety notes in the individual chapters.

10.1 Motor malfunctions

Malfunction	Possible cause	Remedy
Motor does not start up	Supply cable interrupted	Check the connections and (intermediate) terminal points, correct if necessary)
	Brake does not release	See chapter "Brake malfunctions"
	Supply cable fuse has blown	Replace fuse
	Motor protection (switch) has triggered	Check that the motor protection (switch) is set correctly; current specification is on the nameplate
	Motor protection does not trip	Check motor protection control
	Malfunction in control or in the control process	Observe the switching sequence; correct if necessary
Motor only starts with difficulty or does not start at all	Motor power designed for delta connection but connected in star	Correct the connection from star to delta; follow the wiring diagram
	Motor power designed for star-star connection but only connected in star	Correct the connection from star to star-star; follow the wiring diagram
	Voltage or frequency deviate considerably from setpoint, at least while being switched on	Provide better power supply system; reduce the power supply load; Check cross section of supply cable, replace with cable of larger cross section if need be
Motor does not start in star connection, only in delta connection	Star connection does not provide sufficient torque	If the delta inrush current is not too high (observe the regulations of the power supplier), start up directly in delta; Check the project planning and use a larger motor or special version if necessary (consult SEW-EURODRIVE)
	Contact fault on star/delta switch	Check the switch, replace if necessary; Check the connections
Incorrect direction of rotation	Motor connected incorrectly	Swap two phases of the motor supply cable
Motor hums and has high current consumption	Brake does not release	See chapter "Brake malfunctions"
	Winding defective	Send motor to specialist workshop for repair
	Rotor rubbing	
Fuses blow or motor protection trips immediately	Short circuit in the motor supply cable	Repair short circuit
	Supply cables connected incorrectly	Correct the wiring, observe the wiring diagram
	Short circuit in motor	Send motor to specialist workshop for repair
	Ground fault on motor	
Severe speed loss under load	Motor overload	Measure power, check project planning and use larger motor or reduce load if necessary
	Voltage drops	Check cross section of supply cable, replace with cable of larger cross section if need be
Motor heats up excessively (measure temperature)	Overload	Measure power, check project planning and use larger motor or reduce load if necessary
	Insufficient cooling	Provide for cooling air supply or clear cooling air passages, retrofit forced cooling fan if necessary. Check the air filter, clean or replace if necessary
	Ambient temperature too high	Observe the permitted temperature range, reduce the load if necessary
	Motor in delta connection instead of star connection as provided for	Correct the wiring, observe the wiring diagram
	Loose contact in supply cable (one phase missing)	Tighten loose contact, check connections, observe wiring diagram
	Fuse has blown	Look for and rectify cause (see above); replace fuse
	Line voltage deviates from the rated motor voltage by more than 5% (range A)/ 10% (range B).	Adjust motor to line voltage.
	Rated operation type (S1 to S10, DIN 57530) exceeded, e.g. through excessive starting frequency	Adjust the rated operating mode of the motor to the required operating conditions; consult a professional to determine the correct drive if necessary

Malfunction	Possible cause	Remedy
Excessively loud	Ball bearing compressed, dirty or damaged	Re-align motor and the driven machine, inspect rolling bearing and replace if necessary. See section"Permitted rolling bearing types" (page 145).
	Vibration of rotating parts	Look for the case, possibly an imbalance; correct the cause, observe method for balancing
	Foreign bodies in cooling air passages	Clean the cooling air passages

10.2 Brake malfunctions

Malfunction	Possible cause	Remedy
Brake does not release	Incorrect voltage on brake control unit	Apply the correct voltage; brake voltage specified on the nameplate
	Brake control unit failed	Install a new brake control, check resistors and insulation of the brake coils (see "Resistors" section for resistance values). Check switchgear, replace if necessary
	Max. permitted working air gap exceeded because brake lining worn down.	Measure and set working air gap. See the following sections: • "Setting the working air gap of brakes BE05-BE32" If the brake disk is too thin, replace the brake disk. See the following sections: • "Replacing the brake disk of BE05-BE32 brakes"
	Voltage drop on supply cable > 10%	Provide correct connection voltage: brake voltage specifications on the nameplate. Check the cross section of the brake supply cable; increase cross section if necessary.
	Inadequate cooling, brake overheats	Provide for cooling air supply or clear cooling air passages, check air filter, clean or replace if necessary. Replace type BG brake rectifier with type BGE.
	Brake coil has interturn short circuit or a short circuit to frame	Check resistors and insulation of the brake coils (see "Resistors" section for resistance values). Replace complete brake and brake control (specialist workshop), Check switchgear, replace if necessary
	Rectifier defective	Replace rectifier and brake coil; it may be more economical to replace the complete brake.
Brake does not brake	Working air gap not correct	Measure and set working air gap. See the following sections: • "Setting the working air gap of brakes BE05-BE32" If the brake disk is too thin, replace the brake disk. See the following sections: • "Replacing the brake disk of BE05-BE32 brakes"
	Brake lining worn	Replace entire brake disk. See the following sections: • "Replacing the brake disk of BE05-BE32 brakes"
	Incorrect braking torque.	Check the project planning and change the braking torque if needed; see chapter "Technical Data" > "Work done, working air gap, braking torques" • by changing the type and number of brake springs. See the following sections: – "Changing the braking torque of brakes BE05-BE32" (page 119) • by selecting a different brake See section "Braking torque assignment"
Brake does not brake	Working air gap so large that setting nuts for the manual release come into contact.	Set the working air gap. See the following sections: • "Setting the working air gap of brakes BE05-BE32"
	Manual brake release device not set correctly	Set the setting nuts for the manual release correctly See the following sections: • "Changing the braking torque of brakes BE05-BE32" (page 119)
	Brake locked by manual brake release HF	Loosen the setscrew, remove if necessary
Brake is applied with time lag	Brake is switched only on AC voltage side	Switch both the DC and AC circuits (e.g. by retrofitting the SR current relay to BSR); observe wiring diagram
Noises in vicinity of brake	Gearing wear on the brake disk or the carrier caused by jolting startup	Check the project planning, replace the brake disk if necessary See the following sections: • "Replacing the brake disk of BE05-BE32 brakes" Have a specialist workshop replace the carrier
	Alternating torques due to incorrectly set frequency inverter	Check correct setting of frequency inverter according to its operating instructions, correct if necessary.

10.3 Malfunctions when operated with a frequency inverter

The symptoms described in chapter "Motor malfunctions" can also occur when the motor is operated with a frequency inverter. Please refer to the frequency inverter operating instructions for the meaning of the problems that occur and to find information about rectifying the problems.

10.4 Disposal

Dispose of the motors in accordance with the material structure and the regulations in force:

- Iron
- Aluminum
- Copper
- Plastic
- Electronic components
- Oil and grease (not mixed with solvents)

10.5 Customer service

Please have the following information to hand if you require the assistance of our customer service:

- Nameplate data (complete)
- Type and extent of the problem
- Time the problem occurred and any accompanying circumstances
- Assumed cause
- Environmental conditions e.g.:
  - Ambient temperature
  - Humidity
  - Installation altitude
  - Dirt
  - etc.

11 Appendix

11.1 Wiring diagrams

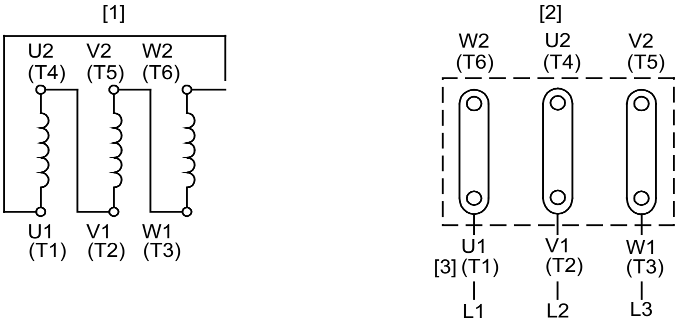
INFORMATION

The motor should be connected as shown in the connection wiring diagram or the assignment diagram, which are supplied with the motor. The following chapter only shows a selection of the common types of connections. You can obtain the relevant wiring diagrams free of charge from SEW-EURODRIVE.

11.1.1 Wiring diagram R13 (68001 xx 06)

△ connection

The following figure shows △ connection for low voltage.

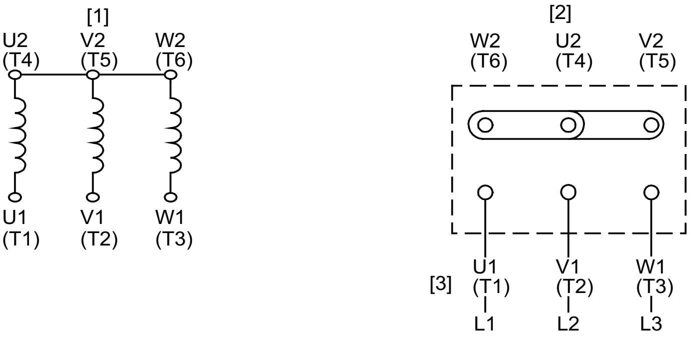

[1]
U2 (T4)
V2 (T5)
W2 (T6)
U1 (T1)
V1 (T2)
W1 (T3)
[2]
W2 (T6)
U2 (T4)
V2 (T5)
U1
[3] (T1)
V1 (T2)
W1 (T3)
L1
L2
L3

242603147

[1] Motor winding
[2] Motor terminal board
[3] Supply cables

⅄ connection

The following figure shows ⅄ connection for high voltage.


[1]
U2 (T4)
V2 (T5)
W2 (T6)
U1 (T1)
V1 (T2)
W1 (T3)
[2]
W2 (T6)
U2 (T4)
V2 (T5)
[3]
U1 (T1)
V1 (T2)
W1 (T3)
L1
L2
L3

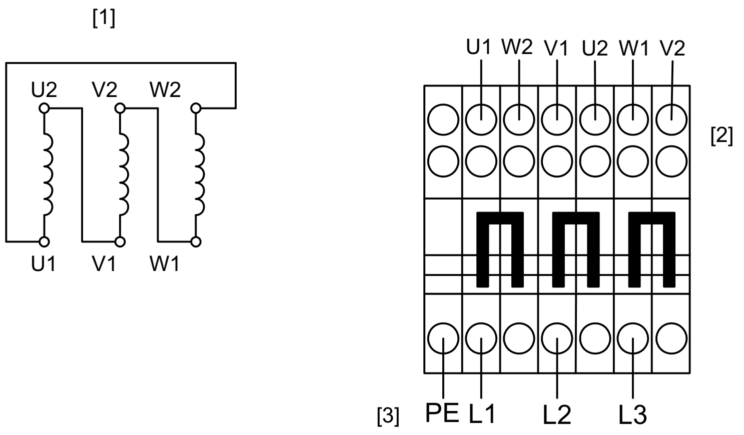
242598155

[1] Motor winding
[2] Motor terminal board
[3] Supply cables

Change in direction of rotation: Swap connection of 2 supply cables, L1 - L2

11.1.2 Wiring diagram C13 (68184 xx 08)

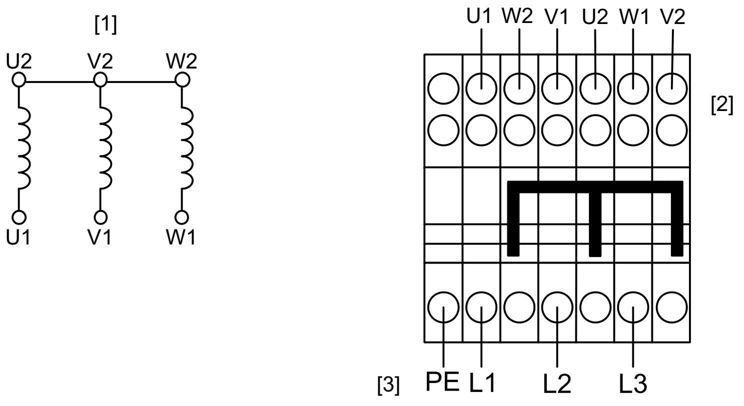
△ *connection* The following figure shows △ connection for low voltage.


[1]
U2
V2
W2
U1
V1
W1
U1 W2 V1 U2 W1 V2
[2]
[3]
PE
L1
L2
L3

2931852427

[1] Motor winding
[2] Motor terminal board
[3] Supply cables

⅄ *connection* The following figure shows ⅄ connection for high voltage.


[1]
U2
V2
W2
U1
V1
W1
U1 W2 V1 U2 W1 V2
[2]
[3]
PE
L1
L2
L3

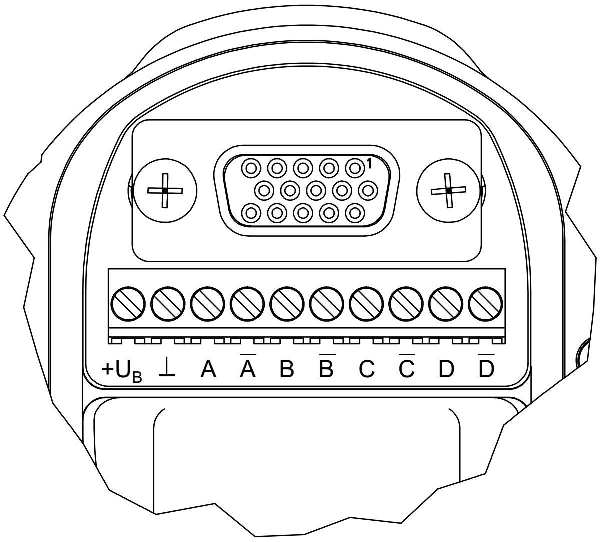
2931850507

[1] Motor winding
[2] Motor terminal board
[3] Supply cables

Change in direction of rotation: Swap connection of 2 supply cables, L1 - L2

11.2 Encoders ES7. /AS7. /EG7. /AG7.

Observe the notes in chapter "Encoder connection" when connecting the encoder.



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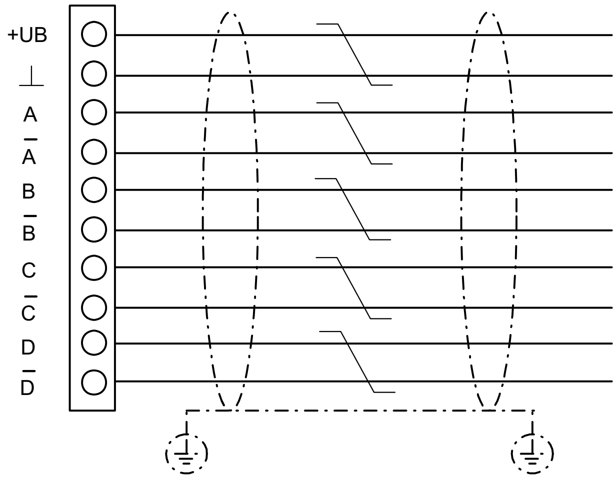


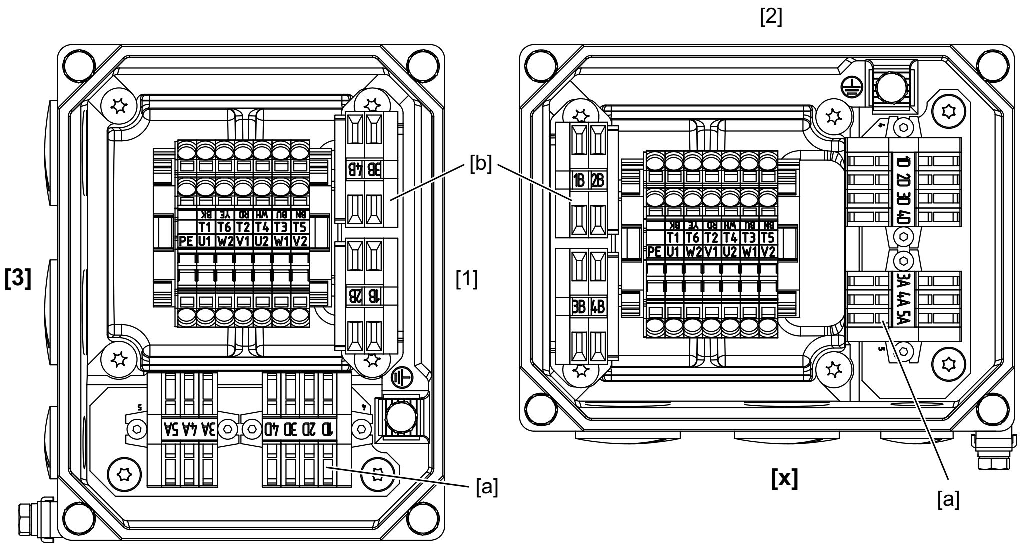
	AS7W, AG7W	**AS7Y, AG7Y**	**ES7C, EG7C, ES7R, EG7R**	**ES7S, EG7S**
+UB	$+V_B$	$+V_B$	$+V_B$	$+V_B$
⊥	DGND	DGND	DGND	DGND
A	Cos+	Cos+	A	Cos+
$\overline{A}$	Cos-	Cos-	$\overline{A}$	Cos-
B	Sin+	Sin+	B	Sin+
$\overline{B}$	Sin-	Sin-	$\overline{B}$	Sin-
C	–	Clock+	C	C
$\overline{C}$	–	Clock-	$\overline{C}$	$\overline{C}$
D	Data+	Data+	–	Data+
$\overline{D}$	Data-	Data-	–	Data-

3865235083

11.3 Terminal strips 1 and 2

The following figure shows the arrangement of the terminal strips for the different terminal box positions.

Terminal box position 1 and 3, here 3[1)] **Terminal box position X and 2, here X[1)]**



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1) If terminal strip 1 does not exist, you can install terminal strip 2 in the position for terminal strip 1.

[1]	Terminal box position 1	[X]	terminal box position X
[2]	Terminal box position 2	[a]	Terminal strip 1
[3]	Terminal box position 3	[b]	Terminal strip 2

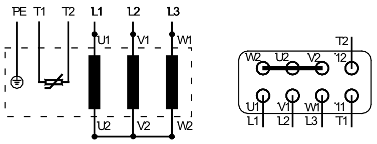
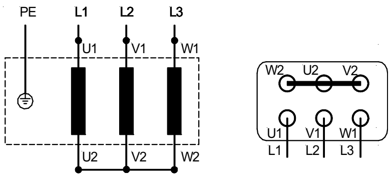
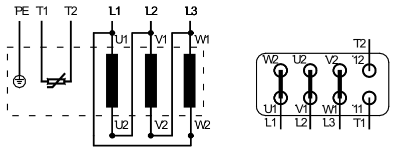
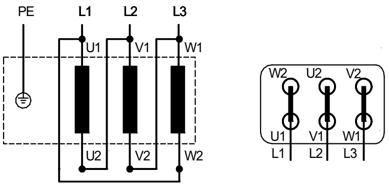
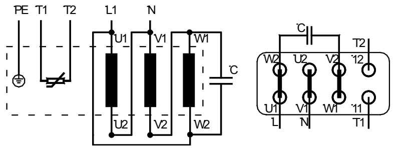
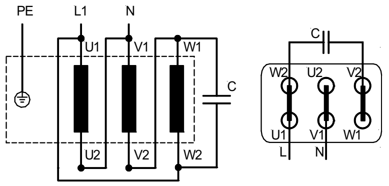
The terminals can vary in appearance and design depending on the terminal box variant and the connected options.

INFORMATION

- Remove any cables that are already connected before taking out terminal strip 2.
- The connected cables must be free from bends and twists, etc. when they are connected again.

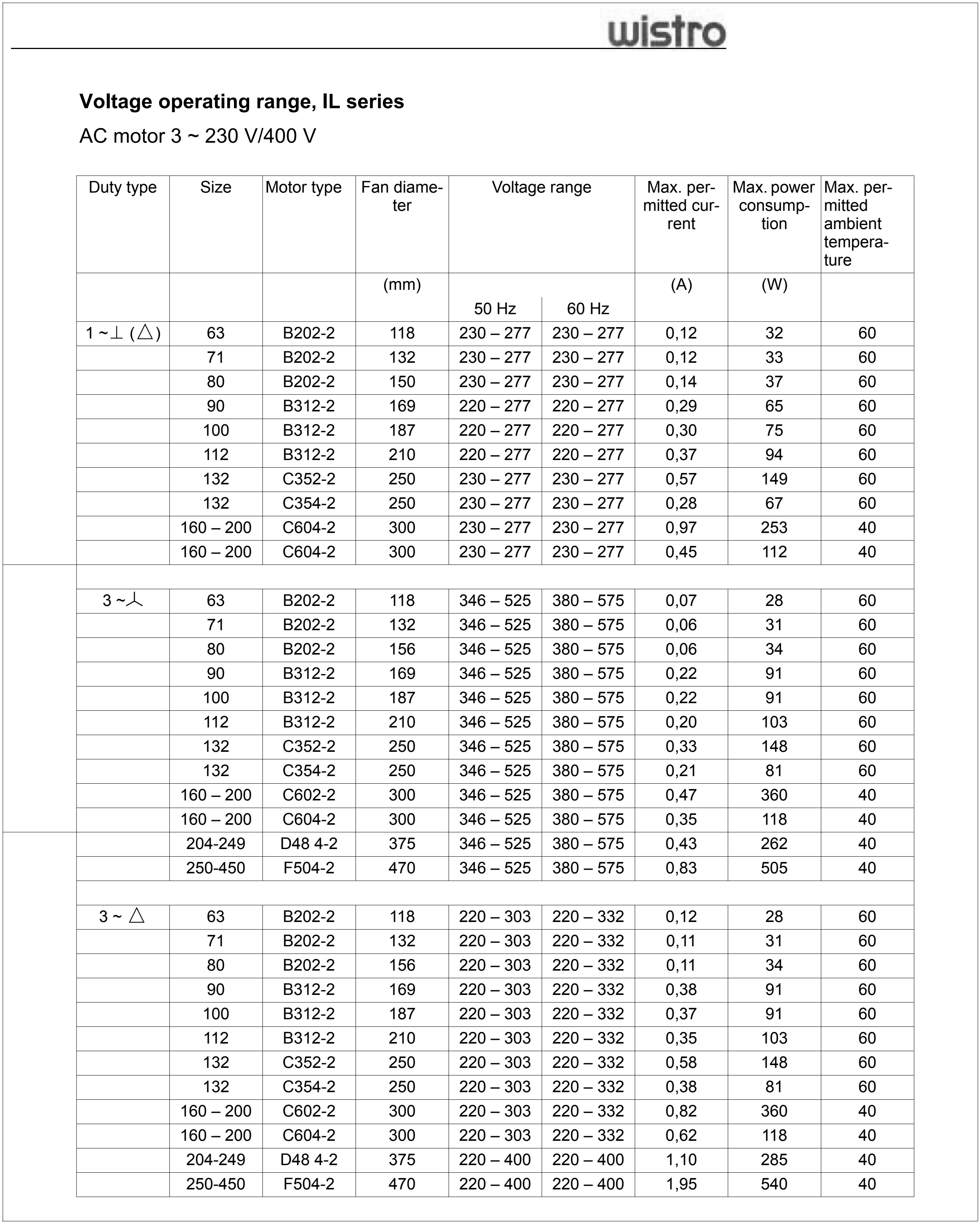
11.4 Forced cooling fan VE

11.4.1 Electrical connection, IL series (appendix 1)

	Electrical connection of motor type B20...C60	Electrical connection of motor type D48...F50
3~ ⅄ Star connection	 PE T1 T2 L1 L2 L3 U1 V1 W1 U2 V2 W2 T2 T1	 PE L1 L2 L3 U1 V1 W1 U2 V2 W2
3~ △ Delta connection	 PE T1 T2 L1 L2 L3 U1 V1 W1 U2 V2 W2 T2 T1	 PE L1 L2 L3 U1 V1 W1 U2 V2 W2
1~ ⊥ (△) Delta Steinmetz	 PE T1 T2 L1 N U1 V1 W1 U2 V2 W2 C T2 T1 L	 PE L1 N U1 V1 W1 U2 V2 W2 C L

U1 (T1) = black
V1 (T2) = light blue
W1 (T3) = brown
U2 (T4) = green
V2 (T5) = white
W2 (T6) = yellow

11.4.2 Voltage operating range IL series



wistro

Voltage operating range, IL series

AC motor 3 ~ 230 V/400 V

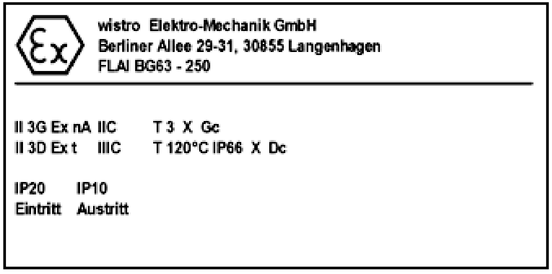
Duty type	Size	Motor type	Fan diameter	Voltage range		Max. permitted current	Max. power consumption	Max. permitted ambient temperature
			(mm)	50 Hz	60 Hz	(A)	(W)	
1 ~⊥ (△)	63	B202-2	118	230 – 277	230 – 277	0,12	32	60
	71	B202-2	132	230 – 277	230 – 277	0,12	33	60
	80	B202-2	150	230 – 277	230 – 277	0,14	37	60
	90	B312-2	169	220 – 277	220 – 277	0,29	65	60
	100	B312-2	187	220 – 277	220 – 277	0,30	75	60
	112	B312-2	210	220 – 277	220 – 277	0,37	94	60
	132	C352-2	250	230 – 277	230 – 277	0,57	149	60
	132	C354-2	250	230 – 277	230 – 277	0,28	67	60
	160 – 200	C604-2	300	230 – 277	230 – 277	0,97	253	40
	160 – 200	C604-2	300	230 – 277	230 – 277	0,45	112	40
3 ~⅄	63	B202-2	118	346 – 525	380 – 575	0,07	28	60
	71	B202-2	132	346 – 525	380 – 575	0,06	31	60
	80	B202-2	156	346 – 525	380 – 575	0,06	34	60
	90	B312-2	169	346 – 525	380 – 575	0,22	91	60
	100	B312-2	187	346 – 525	380 – 575	0,22	91	60
	112	B312-2	210	346 – 525	380 – 575	0,20	103	60
	132	C352-2	250	346 – 525	380 – 575	0,33	148	60
	132	C354-2	250	346 – 525	380 – 575	0,21	81	60
	160 – 200	C602-2	300	346 – 525	380 – 575	0,47	360	40
	160 – 200	C604-2	300	346 – 525	380 – 575	0,35	118	40
	204-249	D48 4-2	375	346 – 525	380 – 575	0,43	262	40
	250-450	F504-2	470	346 – 525	380 – 575	0,83	505	40
3 ~ △	63	B202-2	118	220 – 303	220 – 332	0,12	28	60
	71	B202-2	132	220 – 303	220 – 332	0,11	31	60
	80	B202-2	156	220 – 303	220 – 332	0,11	34	60
	90	B312-2	169	220 – 303	220 – 332	0,38	91	60
	100	B312-2	187	220 – 303	220 – 332	0,37	91	60
	112	B312-2	210	220 – 303	220 – 332	0,35	103	60
	132	C352-2	250	220 – 303	220 – 332	0,58	148	60
	132	C354-2	250	220 – 303	220 – 332	0,38	81	60
	160 – 200	C602-2	300	220 – 303	220 – 332	0,82	360	40
	160 – 200	C604-2	300	220 – 303	220 – 332	0,62	118	40
	204-249	D48 4-2	375	220 – 400	220 – 400	1,10	285	40
	250-450	F504-2	470	220 – 400	220 – 400	1,95	540	40

With reference endshield on B-side

11.5 Operating and maintenance instructions for WISTRO forced cooling fans

Proceed as described in the operating and maintenance instructions for WISTRO forced cooling fans:

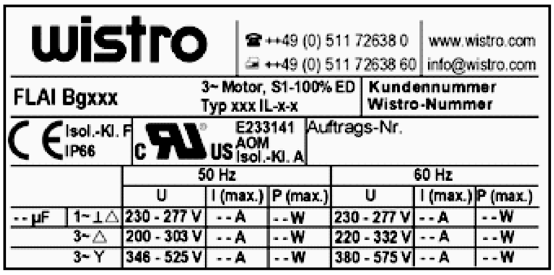
OPERATING AND MAINTENANCE INSTRUCTIONS
EXPLOSION-PROOF WISTRO FORCED COOLING FANS for use in potentially explosive dust or gas atmospheres
SERIES FLAI Bg 63 - 250



wistro Elektro-Mechanik GmbH
Berliner Allee 29-31, 30855 Langenhagen
FLAI BG63 - 250

II 3G Ex nA IIC T 3 X Gc
II 3D Ex t IIIC T 120°C IP66 X Dc

IP20 IP10
Eintritt Austritt



wistro
☎ ++49 (0) 511 72638 0
++49 (0) 511 72638 60
www.wistro.com
info@wistro.com

FLAI Bgxxx
3~ Motor, S1-100% ED
Typ xxx IL-x-x
Kundennummer
Wistro-Nummer

Isol.-Kl. F
IP66
E233141
AOM
Isol.-Kl. A
Auftrags-Nr.

		50 Hz			60 Hz		
		U	I (max.)	P (max.)	U	I (max.)	P (max.)
-- µF	1~⊥△	230 - 277 V	-- A	-- W	230 - 277 V	-- A	-- W
	3~△	200 - 303 V	-- A	-- W	220 - 332 V	-- A	-- W
	3~ Y	346 - 525 V	-- A	-- W	380 - 575 V	-- A	-- W

II 3 G Ex na IIC T3 Gc IP20

Units for use in other potentially explosive atmospheres (above ground)

Category 3 for zone 2 and 22
EX atmosphere G: GAS / D: Flammable dust atmosphere
Explosion protection
Protection type nA: Non-sparking equipment; t: Protection through housing

Explosion group IIC: Gases of group IIC; IIIC: Conducting dust

Temperature class/maximum surface temperature T3 = 200 °C
Unit protection level Dc, Gc
The degrees of protection IP20 inlet and IP20 outlet refer to the air inlet and outlet end.

The forced cooling fan is intended for cooling electric motors in potentially explosive atmospheres in zone 2 or 22. The motor that is to be cooled must comply with Directive 94/9/EC. The maximum permitted surface temperature is 120 °C for unit class II 3D and T3 for unit class II 3G. The degree of protection for motor and terminal box is IP66.

The unit is not suitable for installation in atmospheres subject to chemical influences; furthermore, it is not suitable for transporting flammable liquids. The installation must be vibration-free.

X - The ambient temperatures for the individual sizes are listed in appendix 2.
- The maximum surface temperature was measured with a voltage deviation of ±5% according to IEC 60034-1 without safety factor and without dust deposit.

The relevant safety regulations regarding the protection against contact with moving parts (DIN EN ISO 13857) are fulfilled.

Before installation, make sure that the fan wheel is running smoothly and that the blades of the fan wheel are not deformed or bent. This could create unbalances that have a negative effect on the service life. The degree of protection IP10 on the air outlet end must be ensured by the operator on site according to IEC 60034-5.

The installation of the unit must be carried out by qualified personnel while there is no potentially explosive atmosphere and checked and documented by an authorized person.

The electrical connection depends on the operating mode (single phase or three phase) according to the wiring diagram (see appendix). The wiring diagram is also stamped or attached to the terminal box cover. The provisions of EN 60079-14 must be observed for the connection.

The inner connections are established via terminal screws (tightening torque 1.2 + 1.5 Nm). The cables that are connected must be equipped with insulated cable lugs or insulated ring terminals.

The installed screw plug (M16x1.5 thread) is only intended for transport purposes. During normal operation, it must be replaced with cable glands or closing plugs that are approved for use in potentially explosive atmospheres with gases, vapors, mists with minimum protection type "n" and for use in potentially explosive atmospheres with flammable dusts with protection type "t" (protection through housing). The cable glands and closing plugs must also comply with the standards listed on the first page and provide at least IP66. Furthermore, the cable glands or closing plugs must be suited for the respective ambient temperatures. The cable glands must be appropriate for the cable cross section.

The unit must be grounded via the ground connection in the housing.

The max. permitted currents are listed in the table "Voltage operating range – IL series " (see appendix).

After the electrical connections have been established, the terminal box cover must be attached with the screws with a tightening torque of 5.5-6 Nm.

After installation and during startup, a test run must be performed. When this is done, make sure that the direction of rotation of the fan wheel corresponds to the direction arrow on the inside surface of the ventilation grid so that air is blown over the motor that is to be cooled.

Important: If the direction of rotation is incorrect, the cooling performance is considerably lower. There is a risk that the machine part which is to be cooled will overheat.

During operation, make sure that excessive dust does not accumulate on the fan blades, especially in dusty environments, as this generates imbalances that reduce the service life and friction that could cause an ignition. This also applies to environments containing small particles, e.g. in the wood processing industry or coal mills. A canopy is recommended for these or similar applications.

A canopy can easily be retrofitted by loosening the four flange bolts (Instar bolts), inserting the angle brackets, and retightening the screws.

WISTRO units are normally ready for installation when supplied. The bearings are designed to be maintenance-free for a service life of 40,000 operating hours.

The forced cooling fan must be replaced by a new unit after a longer operating period.

Repairs or modifications of the unit must only be carried out after consultation with WISTRO.

Manufacturer:

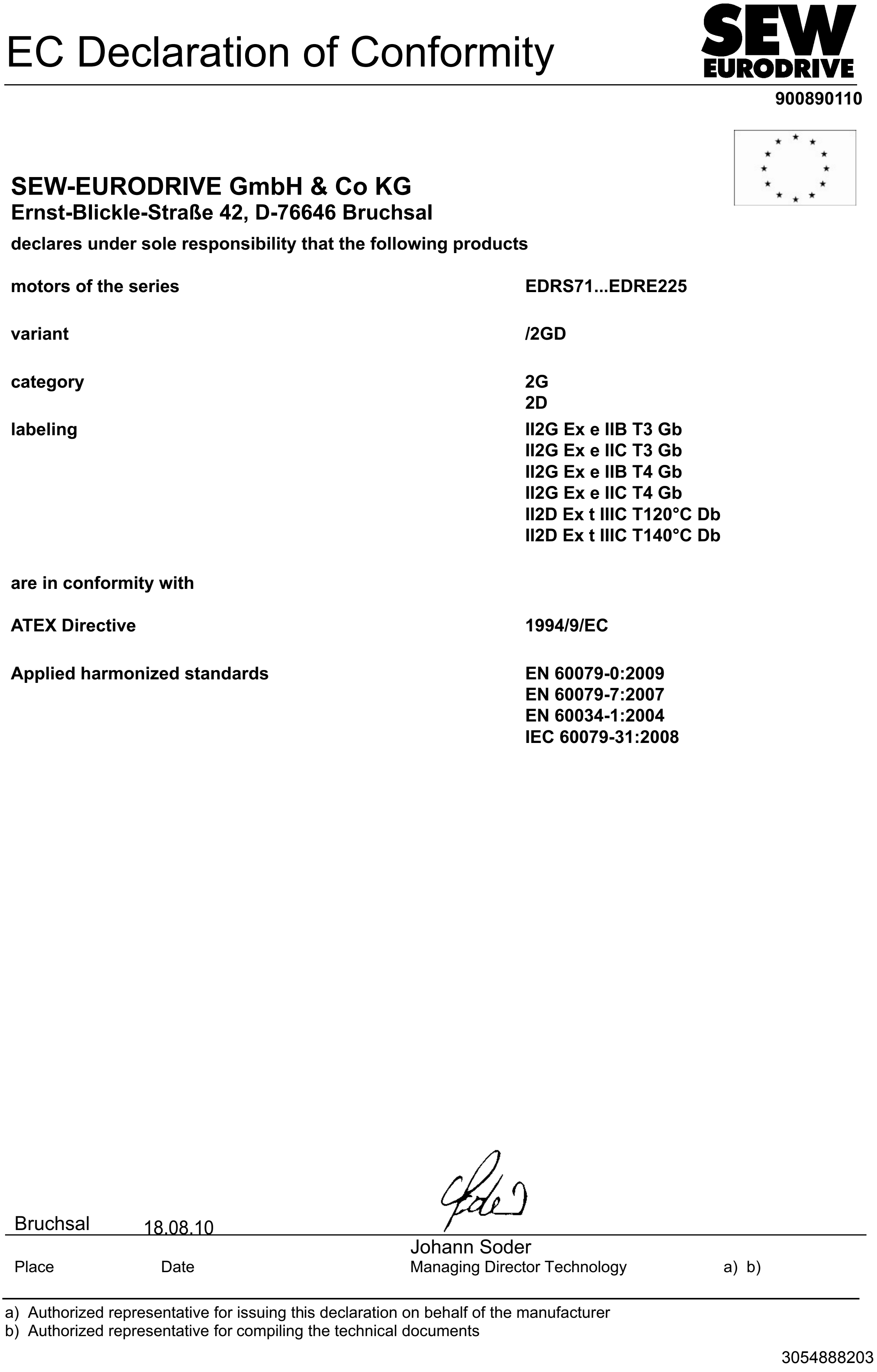
WISTRO Elektro - Mechanik GmbH
Berliner Allee 29-31
D 30855 Langenhagen

12 Declarations of Conformity

INFORMATION

The EC prototype test certificate is provided with the drive. The notified body as well as the technical details are listed in the provided EC prototype test certificate.

12.1 EDR.71 – EDR.225 AC motors in category 2G and 2D



EC Declaration of Conformity

900890110

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

declares under sole responsibility that the following products

motors of the series	**EDRS71...EDRE225**
variant	**/2GD**
category	**2G** **2D**
labeling	**II2G Ex e IIB T3 Gb** **II2G Ex e IIC T3 Gb** **II2G Ex e IIB T4 Gb** **II2G Ex e IIC T4 Gb** **II2D Ex t IIIC T120°C Db** **II2D Ex t IIIC T140°C Db**

are in conformity with

ATEX Directive	**1994/9/EC**
Applied harmonized standards	**EN 60079-0:2009** **EN 60079-7:2007** **EN 60034-1:2004** **IEC 60079-31:2008**

Place	Date	Managing Director Technology	a) b)
Bruchsal	18.08.10	Johann Soder	

a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents

3054888203

12.2 EDR.71 – EDR.225 AC motors in category 3G and 3D

EC Declaration of Conformity

900860110

SEW-EURODRIVE GmbH & Co KG

Ernst-Blickle-Straße 42, D-76646 Bruchsal

declares under sole responsibility that the following products

motors of the series	**EDRS71...EDRE225**
variant	**/3GD** **/3D**
category	**3G** **3D**
labeling	**II3G Ex nA IIB T3 Gc** **II3G Ex nA IIC T3 Gc** **II3D Ex t IIIB T120°C Dc** **II3D Ex t IIIB T140°C Dc** **II3D Ex t IIIC T120°C Dc** **II3D Ex t IIIC T140°C Dc**

are in conformity with

ATEX Directive	**1994/9/EC**
Applied harmonized standards	**EN 60079-0:2009** **EN 60079-15:2005** **EN 60034-1:2004** **IEC 60079-31:2008**

Bruchsal	18.08.10	Johann Soder	
Place	Date	Managing Director Technology	a) b)

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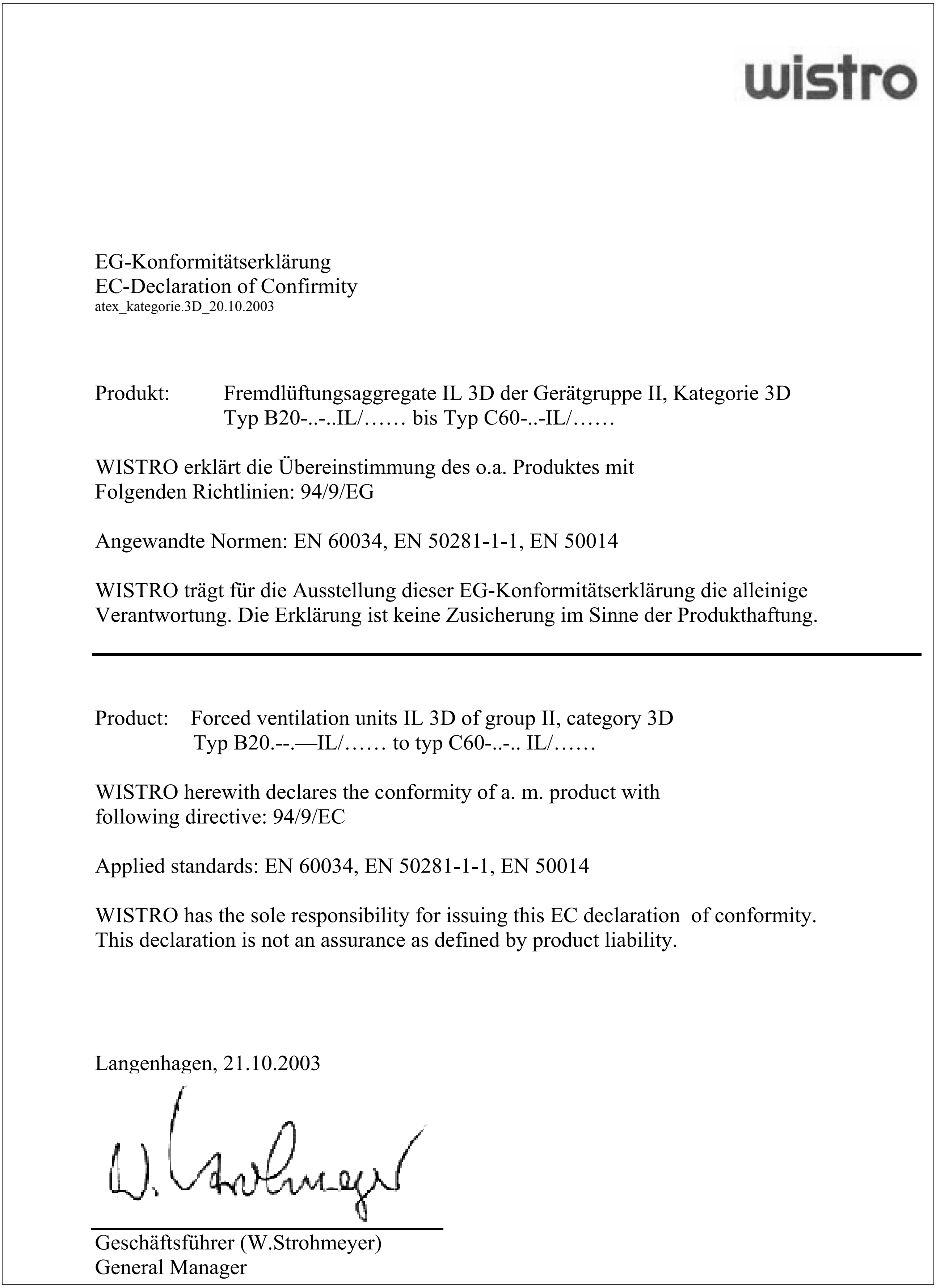
a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents

3055020939

12.3 VE forced cooling fan



wistro

EG-Konformitätserklärung
EC-Declaration of Confirmity
atex_kategorie.3D_20.10.2003

Produkt: Fremdlüftungsaggregate IL 3D der Gerätgruppe II, Kategorie 3D
Typ B20-..-..IL/…… bis Typ C60-..-IL/……

WISTRO erklärt die Übereinstimmung des o.a. Produktes mit Folgenden Richtlinien: 94/9/EG

Angewandte Normen: EN 60034, EN 50281-1-1, EN 50014

WISTRO trägt für die Ausstellung dieser EG-Konformitätserklärung die alleinige Verantwortung. Die Erklärung ist keine Zusicherung im Sinne der Produkthaftung.

Product: Forced ventilation units IL 3D of group II, category 3D
Typ B20.--.—IL/…… to typ C60-..-.. IL/……

WISTRO herewith declares the conformity of a. m. product with following directive: 94/9/EC

Applied standards: EN 60034, EN 50281-1-1, EN 50014

WISTRO has the sole responsibility for issuing this EC declaration of conformity. This declaration is not an assurance as defined by product liability.

Langenhagen, 21.10.2003

Geschäftsführer (W.Strohmeyer)
General Manager

13 Address List

Germany			
Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 • D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Production / Industrial Gears	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Christian-Pähr-Str.10 D-76646 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-2970
Service Competence Center	**Central**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte@sew-eurodrive.de
	North	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 D-30823 Garbsen (near Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-elektronik@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357 14 euro cents/min on the German landline network. Max 42 euro cents/min from a German mobile network. Prices for mobile and international calls may differ.
	Additional addresses for service in Germany provided on request!		

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54 route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Production	**Forbach**	SEW-USOCOME Zone industrielle Technopôle Forbach Sud B. P. 30269 F-57604 Forbach Cedex	Tel. +33 3 87 29 38 00
Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62 avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15

France			
	Nantes	SEW-USOCOME Parc d'activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20
	Paris	SEW-USOCOME Zone industrielle 2 rue Denis Papin F-77390 Verneuil I'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

Algeria			
Sales	**Alger**	REDUCOM Sarl 16, rue des Frères Zaghnoune Bellevue 16200 El Harrach Alger	Tel. +213 21 8214-91 Fax +213 21 8222-84 info@reducom-dz.com http://www.reducom-dz.com

Argentina			
Assembly **Sales**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://www.sew-eurodrive.at sew@sew-eurodrive.at

Belarus			
Sales	**Minsk**	SEW-EURODRIVE BY RybalkoStr. 26 BY-220033 Minsk	Tel.+375 17 298 47 56 / 298 47 58 Fax +375 17 298 47 54 http://www.sew.by sales@sew.by

Belgium			
Assembly **Sales** **Service**	**Brussels**	**SEW-EURODRIVE** Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be
Service Competence Center	**Industrial Gears**	**SEW-EURODRIVE** Rue de Parc Industriel, 31 BE-6900 Marche-en-Famenne	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-wallonie@sew-eurodrive.be

Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 152 - Rodovia Presidente Dutra Km 208 Guarulhos - 07251-250 - SP SAT - SEW ATENDE - 0800 7700496	Tel. +55 11 2489-9133 Fax +55 11 2480-3328 http://www.sew-eurodrive.com.br sew@sew.com.br

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@bever.bg

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 33 431137 Fax +237 33 431137 electrojemba@yahoo.fr

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, ON L6T 3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.watson@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. Tilbury Industrial Park 7188 Honeyman Street Delta, BC V4G 1G1	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Lasalle, PQ H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 http://www.sew-eurodrive.cl ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 info@sew-eurodrive.cn http://www.sew-eurodrive.com.cn
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267922 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478388 Fax +86 27 84478389 wuhan@sew-eurodrive.cn

China			
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 68686262 Fax +86 29 68686311 xian@sew-eurodrive.cn
	Additional addresses for service in China provided on request!		
Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sewcol@sew-eurodrive.com.co
Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. Zeleni dol 10 HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr
Czech Republic			
Sales	**Prague**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Lužná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 255 709 601 Fax +420 220 121 237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz
Denmark			
Assembly **Sales** **Service**	**Copenhagen**	SEW-EURODRIVEA/S Geminivej 28-30 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk
Egypt			
Sales **Service**	**Cairo**	Copam Egypt for Engineering & Agencies 33 El Hegaz ST, Heliopolis, Cairo	Tel. +20 2 22566-299 +1 23143088 Fax +20 2 22594-757 http://www.copam-egypt.com/ copam@datum.com.eg
Estonia			
Sales	**Tallin**	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee
Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Production **Assembly**	**Karkkila**	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi
Gabon			
Sales	**Libreville**	ESG Electro Services Gabun Feu Rouge Lalala 1889 Libreville Gabun	Tel. +241 741059 Fax +241 741059 esg_services@yahoo.fr

Great Britain

Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate Normanton West Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
	Drive Service Hotline / 24 Hour Service		Tel. 01924 896911

Greece

Sales	**Athens**	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong

Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk

Hungary

Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu

India

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Assembly **Sales** **Service**	**Chennai**	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 saleschennai@seweurodriveindia.com
	Vadodara	SEW-EURODRIVE India Private Limited Unit No. 301, Savorite Bldg, Plot No. 143, Vinayak Society, off old Padra Road, Vadodara - 390 007. Gujarat	Tel. +91 265 2325258 Fax +91 265 2325259 salesvadodara@seweurodriveindia.com

Ireland

Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 info@alperton.ie http://www.alperton.ie

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Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il

Italy			
Assembly **Sales** **Service**	**Solaro**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it
Ivory Coast			
Sales	**Abidjan**	SICA Société industrielle & commerciale pour l'Afrique 165, Boulevard de Marseille 26 BP 1115 Abidjan 26	Tel. +225 21 25 79 44 Fax +225 21 25 88 28 sicamot@aviso.ci
Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373855 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp
Kazakhstan			
Sales	**Almaty**	ТОО "СЕВ-ЕВРОДРАЙВ" пр.Райымбека, 348 050061 г. Алматы Республика Казахстан	Тел. +7 (727) 334 1880 Факс +7 (727) 334 1881 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz
Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.com info@alas-kuul.com
Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
Jordan Kuwait Saudi Arabia Syria	**Beirut**	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 info@medrives.com http://www.medrives.com
Lithuania			
Sales	**Alytus**	UAB Irseva Statybininku 106C LT-63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt
Luxembourg			
Assembly **Sales** **Service**	**Brussels**	**SEW Caron-Vector** Research park Haasrode Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be
Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my

Mexico			
Assembly **Sales** **Service**	**Quéretaro**	SEW-EURODRIVE MEXICO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Quéretaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

Morocco			
Sales	**Casablanca**	Afit Route D'El Jadida KM 14 RP8 Province de Nouaceur Commune Rurale de Bouskoura MA 20300 Casablanca	Tel. +212 522633700 Fax +212 522621588 fatima.haquiq@premium.net.ma http://www.groupe-premium.com

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.sew-eurodrive.nl info@sew-eurodrive.nl

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no

Pakistan			
Sales	**Karachi**	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 seweurodrive@cyber.net.pk

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 676 53 00 Fax +48 42 676 53 45 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	24 Hour Service		Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucharest**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 senemeca@sentoo.sn http://www.senemeca.com

Serbia			
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Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-831 06 Bratislava	Tel. +421 2 33595 202 Fax +421 2 33595 200 sew@sew-eurodrive.sk http://www.sew-eurodrive.sk
	Žilina	SEW-Eurodrive SK s.r.o. Industry Park - PChZ ulica M.R.Štefánika 71 SK-010 01 Žilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-974 11 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za info@sew.co.za
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 cfoster@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaco Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za

South Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master.korea@sew-eurodrive.com
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442 00 Fax +46 36 3442 80 http://www.sew-eurodrive.se jonkoping@sew.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 4419164 Fax +90 216 3055867 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

United Arab Emirates			
Sales **Service**	**Sharjah**	Copam Middle East (FZC) Sharjah Airport International Free Zone P.O. Box 120709 Sharjah	Tel. +971 6 5578-488 Fax +971 6 5578-499 copam_me@eim.ae

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	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 332-0038 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
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Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve ventas@sew-eurodrive.com.ve sewfinanzas@cantv.net

Vietnam			
Sales	**Ho Chi Minh City**	**All sectors except for ports, mining and offshore:** Nam Trung Co., Ltd 250 Binh Duong Avenue, Thu Dau Mot Town, Binh Duong Province HCM office: 91 Tran Minh Quyen Street District 10, Ho Chi Minh City	Tel. +84 8 8301026 Fax +84 8 8392223 namtrungco@hcm.vnn.vn truongtantam@namtrung.com.vn khanh-nguyen@namtrung.com.vn
		Ports, mining and offshore: DUC VIET INT LTD Industrial Trading and Engineering Services A75/6B/12 Bach Dang Street, Ward 02, Tan Binh District, 70000 Ho Chi Minh City	Tel. +84 8 62969 609 Fax +84 8 62938 842 totien@ducvietint.com
	Hanoi	Nam Trung Co., Ltd R.205B Tung Duc Building 22 Lang ha Street Dong Da District, Hanoi City	Tel. +84 4 37730342 Fax +84 4 37762445 namtrunghn@hn.vnn.vn

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